

CALIFORNIA
ENERGY
COMMISSION

CALIFORNIA ENERGY DEMAND 2008-2018 STAFF REVISED FORECAST

STAFF FINAL REPORT

OCTOBER 2007
CEC-200-2007-015-SF



Arnold Schwarzenegger, Governor

CALIFORNIA ENERGY COMMISSION

Lynn Marshall
Tom Gorin
Principal Authors

Lynn Marshall
Project Manager

Sylvia Bender
Manager
Demand Analysis Office

Sylvia Bender
Deputy Director
Electricity Supply Analysis

B. B. Blevins
Executive Director

DISCLAIMER

This paper was prepared by a California Energy Commission staff person. It does not necessarily represent the views of the Energy Commission, its employees, or the State of California. The Energy Commission, the State of California, its employees, contractors and subcontractors make no warrant, express or implied, and assume no legal liability for the information in this paper; nor does any party represent that the uses of this information will not infringe upon privately owned rights. This paper has not been approved or disapproved by the California Energy Commission nor has the California Energy Commission passed upon the accuracy or adequacy of the information in this paper.

ACKNOWLEDGEMENTS

The staff demand forecast is the combined product of the hard work and expertise of numerous staff in the Demand Analysis Office. Andrea Gough ran the summary energy model and supervised data preparation. Glen Sharp prepared the residential sector forecast. Mohsen Abrishami prepared the commercial sector forecast. Lynn Marshall and Peter Puglia prepared the industrial forecast. Nahid Movassagh forecasted consumption for the agriculture and water pumping sectors. Mark Ciminelli forecasted energy for transportation, communication and utilities. Mitch Tian prepared the peak demand forecast. Ted Dang prepared the historic energy consumption data. Tom Gorin prepared the demographic projections. Chris Kavalec developed the projections of commercial floor space, with contribution from Adrienne Kandel and Gary Ochiuzzio. Peter Puglia and Kate Sullivan compiled historic and projected economic data. Bill Wood of the natural gas unit provided the natural gas price projections.

ABSTRACT

This document describes California Energy Commission staff's revised forecasts for 2008-2018 electricity, peak, and natural gas demand for each utility planning area in California and for climate zones within those areas. The staff *California Energy Demand 2008-2018* forecast supports the analysis and recommendations of the *2007 Integrated Energy Policy Report*, including electricity and natural gas system assessments and analysis of progress toward energy efficiency, demand response, and renewable energy goals. The final energy and peak demand forecasts for the respective territories of the state's three investor-owned utilities—Pacific Gas and Electric, Southern California Edison, and San Diego Gas & Electric—will be used in the long-term procurement process at the California Public Utilities Commission.

This forecast was produced with the Energy Commission demand forecast models. Both the staff revised energy consumption and peak forecasts are slightly higher than the previous Energy Commission 10-year forecast, prepared for the *2005 Integrated Energy Policy Report*, over the entire forecast period, primarily because both weather-adjusted peak and electricity consumption were slightly higher than previously forecasted. The revised energy forecast is unchanged from the staff draft forecast at the statewide level. The revised peak demand forecast is 1 percent higher than the draft forecast.

Keywords

Electricity demand, electricity consumption, demand forecast, weather normalization, annual peak demand, natural gas demand, self-generation, conservation, California Solar Initiative.

Table of Contents

Executive Summary	2
Introduction	2
Statewide Forecast Results	2
Summary of Revised Utility Area Forecasts.....	5
Natural Gas Demand	7
Overview of Methods and Assumptions.....	8
Chapter 1: Introduction and Statewide Forecast.....	9
Introduction	9
Summary of Changes to Current Forecast	9
Changes from the Draft to Final Forecast	10
Statewide Forecast Results	11
Annual Electricity Consumption	13
Statewide Peak Demand	15
Natural Gas Demand Forecast	18
Methods and Assumptions.....	19
Economic and Demographic Assumptions.....	19
Electricity Prices	20
Residential End-Use Assumptions	21
Commercial Sector Assumptions	22
Conservation in Commission Demand Forecast Models.....	24
Self-Generation Program Impacts.....	30
Demand Response	32
Historic Electricity Consumption Estimates	32
Climate Zone Demand Forecasts	33
Chapter 2: Pacific Gas and Electric Company Planning Area.....	46
Planning Area Results	46
Sector Level Results and Input Assumptions.....	55
Residential Sector.....	55
Commercial Building Sector.....	60
Industrial Sector.....	65
Other Sectors.....	67
Electricity Prices	71
Self Generation.....	71
Conservation Savings Embedded in the Forecast.....	72
Chapter 3: Southern California Edison Planning Area	82
Forecast Results	82
Forecast Results by Climate Zone	87
Sector Level Results and Input Assumptions.....	90
Residential	90
Commercial Building Sector.....	95
Industrial Sector.....	99
Other Sectors.....	102
Electricity Prices	105

Self Generation	105
Conservation Savings Embedded in the Forecast	106
Chapter 4: San Diego Gas & Electric Planning Area	116
Forecast Results	116
Sector Level Results and Input Assumptions.....	120
Residential	120
Commercial Building Sector.....	124
Industrial Sector.....	127
Other Sectors.....	129
Electricity Prices	131
Self-Generation.....	131
Conservation Savings Embedded in the Forecast	132
Chapter 5: Sacramento Municipal Utility District Planning Area.....	141
Forecast Results	141
Sector Level Results and Input Assumptions.....	147
Residential	147
Commercial Building Sector.....	151
Industrial Sector.....	154
Other Sectors.....	157
Electricity Prices	159
Self Generation.....	159
Conservation Savings Embedded in the Forecast	159
Chapter 6: Los Angeles Department of Water and Power Planning Area.....	167
Forecast Results	167
Sector Level Results and Input Assumptions.....	172
Residential	172
Commercial Building Sector.....	176
Industrial Sector	178
Other Sectors.....	181
Electricity Prices.....	183
Self-Generation.....	183
Conservation Savings Embedded in the Forecast	179
Chapter 7: Natural Gas Demand Forecast.....	191
Forecast Results	191
Planning Area Results	193
Pacific Gas and Electric Planning Area	193
Southern California Gas Company Planning Area.....	197
San Diego Gas and Electric Planning Area	200

List of Figures

Figure ES-1: Statewide Electricity Consumption.....	4
Figure ES-2: Statewide Non-Coincident Peak Demand.....	5
Figure 1: Statewide Electricity Consumption.....	13
Figure 2: Statewide Electricity Consumption per Capita	14
Figure 3: Statewide Electricity Consumption by Sector.....	14
Figure 6: Statewide Peak Demand by Sector (MW).....	17
Figure 7: Total Statewide Population	20
Figure 8: Statewide Personal Income (\$2005)	20
Figure 9: Estimated IOU Residential Consumption and Conservation Impacts	26
Figure 10: Estimated IOU Commercial Consumption and Conservation Impacts...	26
Figure 11: Forecast of Peak Impacts of CSI and SGIP.....	31
Figure 12: PG&E Planning Area Electricity Forecast	49
Figure 13: PG&E Planning Area Peak	49
Figure 14: PG&E Planning Area Per Capita Electricity Consumption	50
Figure 15: PG&E Planning Area per Capita Peak Demand	51
Figure 16: PG&E Planning Area Load Factor	52
Figure 17: PG&E Planning Electricity Forecast by Climate Zone.....	54
Figure 18: PG&E Planning Area Peak Forecast by Climate Zone	54
Figure 19: PG&E Planning Area Residential Consumption.....	55
Figure 20: PG&E Planning Area Residential Electricity Forecast by Climate Zone	56
Figure 21: PG&E Planning Area Households by Climate Zone	56
Figure 22: PG&E Planning Area Residential Peak.....	57
Figure 23: PG&E Planning Area Residential Demographic Projections.....	58
Figure 24: PG&E Planning Area Household Income Projections.....	58
Figure 25: PG&E Planning Area Use per Household.....	59
Figure 26: PG&E Planning Area Peak Use per Household.....	59
Figure 27: PG&E Planning Area Commercial Consumption	60
Figure 28: PG&E Planning Area Commercial Electricity Consumption by Climate Zone	61
Figure 29: PG&E Planning Area Commercial Floor Space by Climate Zone	61
Figure 30: PG&E Planning Area Commercial Sector Peak.....	62
Figure 31: PG&E Planning Area Commercial Floor Space	62
Figure 32: PG&E Planning Area Commercial kWh per Square Foot	64
Figure 33: PG&E Planning Area Commercial Sector Peak Watts per Square Foot	64
Figure 35: PG&E Planning Area Industrial Forecast by Climate Zone	66
Figure 36: PG&E Planning Area Industrial Sector Peak	66
Figure 37: PG&E Planning Area Industrial Sector Use per Production Unit.....	67
Figure 38: PG&E Planning Transportation, Communication, and Utilities and Streetlighting Sector Electricity Forecasts	68
Figure 40: PG&E Planning Area Agriculture and Water Pumping Electricity Forecast by Climate Zone.....	69

Figure 41: PG&E Planning Area Other (Transportation, Communication, and Utilities; Streetlighting; Mining and Oil Extraction) Sector Electricity Forecasts by Climate Zone	70
Figure 42: PG&E Planning Area Other Sector Peak	71
Figure 43: PG&E Planning Area Self-Generation Peak Forecast	72
Figure 44: SCE Planning Area Electricity Forecast	84
Figure 45: SCE Planning Area Peak Demand Forecast	85
Figure 46: SCE Planning Area per Capita Electricity Consumption	86
Figure 47: SCE Planning Area per Capita Peak Demand	86
Figure 48: SCE Planning Area Load Factor	87
Figure 49: SCE Planning Area Electricity Forecast by Climate Zone	89
Figure 50: SCE Planning Area Peak Forecast by Climate Zone	89
Figure 51: SCE Planning Area Residential Consumption	90
Figure 52: SCE Planning Area Residential Electricity Forecast by Climate Zone ...	91
Figure 53: SCE Planning Area Household Forecast by Climate Zone	91
Figure 54: SCE Planning Area Residential Peak	92
Figure 55: SCE Planning Area Residential Demographic Projections	93
Figure 56: SCE Planning Area Household Income Projections	94
Figure 57: SCE Planning Area Energy Use per Household	95
Figure 58: SCE Planning Area Peak Use per Household	95
Figure 59: SCE Planning Area Commercial Consumption	96
Figure 60: SCE Planning Area Commercial Electricity Forecast by Climate Zone..	96
Figure 61: SCE Planning Area Commercial Sector Peak	97
Figure 62: SCE Planning Area Commercial Floor Space	97
Figure 63: SCE Planning Area Commercial kWh per Square Foot	98
Figure 64: SCE Planning Area Commercial Watts per Square Foot	99
Figure 65: SCE Planning Area Industrial Consumption	100
Figure 66: SCE Planning Industrial Electricity Forecast by Climate Zone	101
Figure 67: SCE Planning Area Industrial Sector Peak	101
Figure 68: SCE Planning Area Industrial Peak Use per Production Unit	102
Figure 69: SCE Planning Area Transportation, Communication, and Utilities and Streetlighting Sector Electricity Forecasts	102
Figure 70: SCE Planning Area Other Sector Electricity Forecasts (Agriculture & Water Pumping, Mining & Oil Extraction)	103
Figure 71: SCE Planning Area Agriculture and Water Pumping Electricity Forecast by Climate Zone	104
Figure 72: SCE Planning Area TCU and Streetlighting Electricity Forecast by Climate Zone	104
Figure 73: SCE Planning Area Other Sector Peak	105
Figure 74: SCE Area Self-Generation Peak Demand Forecast	106
Figure 75: SDG&E Planning Area Electricity Forecast	117
Figure 76: SDG&E Planning Area Peak	118
Figure 77: SDG&E Planning Area per Capita Electricity Consumption	118
Figure 78: SDG&E Planning Area per Capita Peak Demand	119
Figure 79: SDG&E Planning Area Peak Load Factor	120
Figure 80: SDG&E Planning Area Residential Consumption	121

Figure 81: SDG&E Planning Area Residential Peak	121
Figure 82: SDG&E Planning Area Residential Demographic Projections	122
Figure 83: SDG&E Planning Area Household Income Projections	123
Figure 84: SDG&E Planning Area Use per Household	123
Figure 85: SDG&E Planning Area Peak Use per Household	124
Figure 86: SDG&E Planning Area Commercial Consumption.....	124
Figure 87: SDG&E Planning Area Commercial Sector Peak	125
Figure 88: SDG&E Planning Area Commercial Floor Space	125
Figure 89: SDG&E Planning Area Commercial kWh per Square Foot.....	126
Figure 90: SDG&E Planning Area Commercial Watts per Square Foot.....	127
Figure 91: SDG&E Planning Area Industrial Consumption	127
Figure 92: SDG&E Planning Area Industrial Sector Peak.....	128
Figure 93: SDG&E Planning Area Industrial Use per Production Unit	129
Figure 94: SDG&E Planning Area Transportation, Communication, and Utilities Sector Electricity Consumption	130
Figure 95: SDG&E Planning Area Agriculture & Water Pumping and Mining & Oil Extraction Electricity Consumption Forecasts.....	130
Figure 96: SDG&E Planning Area Other Sector Peak	131
Figure 97: SDG&E Planning Private Supply Peak (MW)	132
Figure 98: SMUD Planning Area Electricity Forecast.....	143
Figure 99: SMUD Planning Area Peak.....	143
Figure 100: SMUD Planning Area per Capita Electricity Consumption	144
Figure 101: SMUD Planning Area per Capita Peak Demand.....	145
Figure 102: SMUD Planning Area Load Factor.....	146
Figure 103: SMUD Planning Area Residential Consumption	147
Figure 104: SMUD Planning Area Residential Peak.....	148
Figure 105: SMUD Planning Area Residential Demographic Projections	149
Figure 106: SMUD Planning Area Household Income Projections	149
Figure 107: SMUD Planning Area Electricity Use per Household.....	150
Figure 108: SMUD Planning Area Peak Use per Household	150
Figure 109: SMUD Planning Area Commercial Building Consumption	151
Figure 110: SMUD Planning Area Commercial Building Sector Peak.....	152
Figure 111: SMUD Planning Area Commercial Floor Space	152
Figure 112: SMUD Planning Area Commercial kWh per Square Foot.....	152
Figure 113: SMUD Planning Area Peak per Square Foot.....	153
Figure 114: SMUD Planning Area Industrial Consumption	154
Figure 115: SMUD Planning Area Industrial Sector Peak.....	155
Figure 116: SMUD Planning Area Industrial Use per Production Unit	156
Figure 117: SMUD Planning Area Transportation, Communication, and Utilities Sector Electricity Consumption	157
Figure 118: SMUD Planning Area Agriculture and Water Pumping and Mining and Oil Extraction Electricity Consumption Forecasts	158
Figure 119: SMUD Planning Area Other Sector Peak	158
Figure 120: LADWP Planning Area Electricity Forecast	169
Figure 121: LADWP Planning Area Peak	170
Figure 122: LADWP Planning Area per Capita Electricity Consumption.....	170

Figure 123: LADWP Planning Area per Capita Peak Demand	171
Figure 124: LADWP Planning Area Load Factor	171
Figure 125: LADWP Planning Area Residential Consumption	172
Figure 126: LADWP Planning Area Residential Peak.....	173
Figure 127: LADWP Planning Area Residential Demographic Projections	174
Figure 128: LADWP Planning Area Household Income Projections	174
Figure 129: LADWP Planning Area Use per Household	175
Figure 130: LADWP Planning Area Peak Use per Household	175
Figure 131: LADWP Planning Area Commercial Consumption	176
Figure 132: LADWP Planning Area Commercial Sector Peak	176
Figure 133: LADWP Planning Area Commercial Floor Space	177
Figure 134: LADWP Planning Area Commercial kWh per Square Foot.....	178
Figure 135: LADWP Planning Area Commercial Watts per Square Foot.....	178
Figure 136: LADWP Planning Area Industrial Consumption	179
Figure 137: LADWP Planning Area Industrial Sector Peak.....	180
Figure 138: LADWP Planning Area Industrial Use per Production Unit	180
Figure 139: LADWP Planning Area Transportation, Communication, and Utilities Sector Electricity Consumption	181
Figure 140: LADWP Planning Area Agriculture and Water Pumping and Mining and Oil Extraction Electricity Consumption Forecasts	182
Figure 141: LADWP Planning Area Other Sector Peak	182
Figure 142: LADWP Planning Area Self Generation Forecast.....	183
Figure 143: Statewide Natural Gas Demand Forecast.....	192
Figure 144: Statewide per Capita Natural Gas Consumption	193
Figure 145: PG&E Planning Area Residential Consumption.....	194
Figure 146: PG&E Planning Area Commercial Gas Demand	195
Figure 147: PG&E Planning Area Industrial Natural Gas Demand	195
Figure 148: PG&E Planning Area Prices	196
Figure 149: SCG Planning Area Residential Natural Gas Consumption.....	198
Figure 150: SCG Planning Area Commercial Natural Gas Consumption	198
Figure 151: SCG Planning Area Industrial and Mining Natural Gas Consumption	199
Figure 152: SCG Planning Area Prices.....	200
Figure 153: SDG&E Planning Area Residential Natural Gas Consumption	202
Figure 154: SDG&E Planning Area Nonresidential Natural Gas Consumption.....	202
Figure 155: SDG&E Planning Area Prices.....	203

List of Tables

Table ES-1: Comparison of <i>CED 2006</i> and Staff Draft and Revised Forecasts of Statewide Electricity Demand	3
Table ES-2: Revised Electricity Consumption Forecast by Utility Planning Area	6
Table ES-3: Revised Peak Demand Forecast by Utility Planning Area	7
Table ES-4: Comparison of <i>CED 2006</i> Forecast with Staff Draft and Revised Forecasts of Statewide End-User Natural Gas Consumption	8
Table 1: Comparison of <i>CED 2006</i> and Staff Draft and Revised Forecasts of Statewide Electricity Demand	12
Table 2: Net Energy for Load by Control Area (GWH)	15
Figure 4: Statewide Non-Coincident Peak Demand	16
Figure 5: Statewide Non-Coincident Peak Demand per Capita	16
Table 3: Peak Demand (MW) by Control Area	18
Table 4: Statewide End-User Natural Gas Consumption	18
Table 5: Economic/Demographic Variables Specified for Each Building Type	22
Table 6: Estimates of Commercial and Residential Conservation	27
Impacts for PG&E, SCE, and SDG&E	27
Table 7: First Year Impacts of 2004–2008 Energy Efficiency Goals	28
Table 8: Utilities and Climate Zones within Forecasting Areas	35
Table 9: PG&E Planning Area Electricity Consumption Forecast Comparison	47
Table 10: PG&E Planning Area Peak Demand Forecast Comparison	48
Table 11: PG&E Planning Area Electricity Forecast by Climate Zone	53
Table 12: PG&E Planning Area Peak Forecast by Climate Zone	53
Table 13: PG&E Planning Area Electricity Conservation Savings Estimates	73
Table 14: PG&E Planning Area Peak Conservation Savings Estimates	73
Table 15: SCE Planning Area Energy Forecast Comparison	83
Table 16: SCE Planning Area Peak Forecast Comparison	83
Table 17: SCE Planning Area Electricity Consumption by Climate Zone	88
Table 18: SCE Planning Area Peak Demand by Climate Zone	88
Table 19: SCE Planning Area Electricity Conservation Savings Estimates	107
Table 20: SCE Planning Area Peak Conservation Savings Estimates	107
Table 21: SDG&E Planning Area Electricity Consumption Forecast Comparison	116
Table 22: SDG&E Planning Area Peak Forecast Comparison	117
Table 23: SDG&E Planning Area Electricity Conservation Savings Estimates	133
Table 24: SDG&E Planning Area Peak Conservation Savings Estimates	133
Table 25: SMUD Planning Area Electricity Consumption Forecast Comparison ...	142
Table 26: SMUD Planning Area Electricity Consumption Forecast Comparison ...	142
Table 27: SMUD Planning Area Electricity Conservation Savings Estimates	160
Table 28: SMUD Planning Area Peak Conservation Savings Estimates	160
Table 29: LADWP Planning Area Electricity Forecast Comparison	168
Table 30: LADWP Planning Area Peak Forecast Comparison	168
Table 31: LADWP Planning Area Electricity Conservation Savings Estimates	184
Table 32: LADWP Planning Area Peak Conservation Savings Estimates	184
Table 33: Statewide Natural Gas Forecast Comparison	192

Table 34: PG&E Natural Gas Forecast Comparison.....	194
Table 35: SCG Natural Gas Forecast Comparison	197
Table 36: SDG&E Natural Gas Forecast Comparison	201
Table 37: PG&E Natural Gas Forecast by Sector	204
Table 38: SCG Natural Gas Forecast by Sector	205
Table 39: SDG&E Natural Gas Forecast by Sector	206

List of Forms

Chapter 1

1.1	Statewide Electricity Consumption by Sector (GWh)	36
1.1b	Statewide Electricity Sales by Sector (GWh)	37
1.1c	Statewide Retail Electricity Sales by LSE (GWh).....	38
1.3	Statewide Coincident Peak Demand by Sector (GWh)	39
1.5a	Net Energy for Load by Control Area and Major LSE (GWh).....	40
1.5c	1 in 2 Electric Peak Demand by Control Area (MW)	41
1.5c	1 in 5 Electric Peak Demand by Control Area (MW)	42
1.5c	1 in 10 Electric Peak Demand by Control Area (MW)	43
2.1	Statewide Economic and Demographic Assumptions.....	44

Chapter 2

1.1	PG&E Planning Area Electricity Consumption by Sector (GWh)	73
1.1b	PG&E Planning Area Electricity Sales by Sector (GWh).....	74
1.2	PG&E Planning Area Net Energy for Load (GWh)	75
1.3	PG&E Planning Area Coincident Peak Demand by Sector (GWh)	76
1.4	PG&E Planning Area Peak Demand (GWh)	77
1.7a	PG&E Planning Area Private Supply by Sector (GWh).....	78
1.9a	PG&E Planning Area Forecast by LSE	79
1.9b	PG&E Planning Area Forecast by Climate Zone	80
2.2	PG&E Planning Area Economic and Demographic Assumptions	81

Chapter 3

1.1	SCE Planning Area Electricity Consumption by Sector (GWh)	109
1.1b	SCE Planning Area Electricity Sales by Sector (GWh)	110
1.2	SCE Planning Area Net Energy for Load (GWh)	111
1.3	SCE Planning Area Coincident Peak Demand by Sector (GWh).....	112
1.4	SCE Planning Area Peak Demand (GWh).....	113
1.7a	SCE Planning Area Private Supply by Sector (GWh)	114
1.9a	SCE Planning Area Forecast by LSE	115
1.9b	SCE Planning Area Forecast by Climate Zone	116
2.2	SCE Planning Area Economic and Demographic Assumptions.....	117

Chapter 4

1.1	SDG&E Planning Area Electricity Consumption by Sector (GWh)	134
1.1b	SDG&E Planning Area Electricity Sales by Sector (GWh)	135
1.2	SDG&E Planning Area Net Energy for Load (GWh)	136
1.3	SDG&E Planning Area Coincident Peak Demand by Sector (GWh).....	137
1.4	SDG&E Planning Area Peak Demand (GWh).....	138

1.5a	SDG&E Planning Area Extreme Temperature Peak Demand (GWh)...	139
1.7a	SDG&E Planning Area Private Supply by Sector (GWh)	140
2.2	SDG&E Planning Area Economic and Demographic Assumptions	141

Chapter 5

1.1	SMUD Planning Area Electricity Consumption by Sector (GWh).....	161
1.1b	SMUD Planning Area Electricity Sales by Sector (GWh)	162
1.2	SMUD Planning Area Net Energy for Load (GWh)	163
1.3	SMUD Planning Area Coincident Peak Demand by Sector (GWh).....	164
1.4	SMUD Planning Area Peak Demand (GWh).....	165
1.5a	SMUD Planning Area Extreme Temperature Peak Demand (GWh).....	166
2.2	SMUD Planning Area Economic and Demographic Assumptions	167

Chapter 6

1.1	LADWP Planning Area Electricity Consumption by Sector (GWh).....	185
1.1b	LADWP Planning Area Electricity Sales by Sector (GWh).....	186
1.2	LADWP Planning Area Net Energy for Load (GWh)	187
1.3	LADWP Planning Area Coincident Peak Demand by Sector (GWh)	188
1.4	LADWP Planning Area Peak Demand (GWh)	189
1.5a	LADWP Planning Area Extreme Temperature Peak Demand (GWh)...	190
2.2	LADWP Planning Area Economic and Demographic Assumptions	191

EXECUTIVE SUMMARY

Introduction

This California Energy Commission staff report presents forecasts of electricity and end-user natural gas consumption and peak electricity demand for the State of California and for utility planning areas and climate zones within the state for 2008–2018. The staff *California Energy Demand 2008–2018* revised forecast supports the analysis and recommendations of the *2007 Integrated Energy Policy Report*, including electricity and natural gas system assessments and analysis of progress toward energy efficiency, demand response, and renewable energy goals.

Statewide Forecast Results

Table ES-1 compares the staff revised forecast for select years with the staff draft forecast published in June 2007, and the final forecast used in the *2005 Integrated Energy Policy Report*, published in September 2005 in *California Energy Demand 2006–2016*.¹ The staff revised electricity consumption forecast is slightly lower than the draft 2008 forecast in the beginning of the forecast period. The revised electricity forecast is projected to grow at a slightly higher rate (1.3 percent versus 1.2) than the draft forecast over the forecast period. This results in the revised 2008 electricity forecast being about 0.3 percent higher than the draft 2008 electricity forecast by the end of the forecast period. The revised 2008 peak forecast has the same starting point as the draft 2008 forecast and also grows at a faster rate (1.4 percent versus 1.2 percent). This results in the revised 2008 peak forecast being about 1 percent (700 MW) higher than the draft 2008 peak forecast by the end of the forecast period. Both the revised and draft energy consumption forecasts have higher growth rates than the September 2005 forecast (1.2 percent versus 1.1 percent) because of higher projected demand in the residential and commercial sectors.

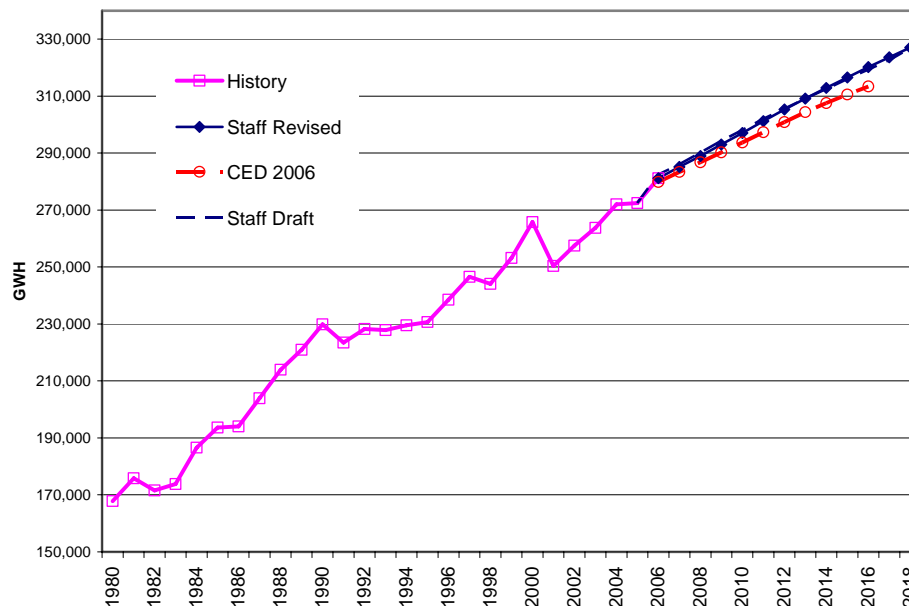
¹ The *California Energy Demand 2008–2018* revised forecast is referred to as the “revised 2008 forecast” or “revised forecast” throughout the report. The draft forecast published in June 2007 is referred to as the “draft 2008 forecast” or “draft forecast” throughout. The final forecast developed in support of the *2005 Integrated Energy Policy Report* and published in *California Energy Demand 2006–2016*, *Staff Energy Demand Forecast, Revised September 2005*, (publication no. CEC-400-2005-034-SF-ED2) is referred to as *CED 2006*.

Table ES-1: Comparison of *CED 2006* and Staff Draft and Revised Forecasts of Statewide Electricity Demand

Consumption (GWH)					
	CED 2006	Staff Draft	Staff Revised	Percent Difference Staff Draft/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	229,375	229,868	229,868	0.22%	0.00%
2000	265,021	265,776	265,769	0.28%	0.00%
2005	276,012	272,491	272,449	-1.28%	-0.02%
2008	286,813	290,187	288,976	1.18%	-0.42%
2013	304,400	309,147	309,148	1.56%	0.00%
2016	313,397	319,331	320,178	1.89%	0.27%
Average Annual Growth Rates					
1990-2000	1.45%	1.46%	1.46%		
2000-2005	0.82%	0.50%	0.50%		
2005-2008	1.29%	2.12%	1.98%		
2008-2016	1.11%	1.20%	1.29%		
Peak (MW)					
	CED 2006	Staff Draft	Staff Revised	Percent Difference Staff Draft/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	47,431	47,209	47,035	-0.47%	-0.37%
2000	54,028	53,661	53,669	-0.68%	0.01%
2005	58,546	58,602	58,646	0.10%	0.07%
2008	61,042	62,935	62,946	3.10%	0.02%
2013	65,144	67,067	67,524	2.95%	0.68%
2016	67,379	69,426	70,174	3.04%	1.08%
Average Annual Growth Rates					
1990-2000	1.31%	1.29%	1.33%		
2000-2005	1.62%	1.78%	1.79%		
2005-2008	1.40%	2.41%	2.39%		
2008-2016	1.24%	1.23%	1.37%		
Historic values are shaded					
GWH=gigawatt-hour					
MW = megawatt					

Higher residential electricity consumption results from higher air conditioning saturations. Revised floor space estimation techniques lead to increased floor space projections, which, accordingly, raise the forecast for commercial electricity consumption. Figure ES-1 shows the effect of these changes from the previous forecast.

Figure ES-1: Statewide Electricity Consumption



On the peak demand side, the revised 2008 forecast is the same as the draft 2008 forecast in 2008, but grows at a slightly higher annual rate. This results in the revised forecast being about 1 percent higher than the draft forecast by the end of the forecast period. The revised 2008 peak forecast is also about 3 percent higher than the September 2005 forecast, consistent with the increases made in 2006 and 2007 Energy Commission updates to the short-term peak demand forecast. The higher recorded peaks represent the effect of higher saturations of residential air conditioning than was previously assumed. Peak demand is now projected to grow at an average of 1.4 percent annually. The primary reason for the higher growth rate of the peak demand forecast compared to the electricity consumption forecast is the lack of impact of the 2005 federal air conditioning standards on peak. While the 2005 standard's change to seasonal energy efficiency rating of 13 is accounted for in the energy consumption projection, some analyses find uncertainty as to whether the move to a higher seasonal energy efficiency ratio actually reduces peak demand; therefore, no effects from the 2005 standards are included in the peak demand forecast.

The growth of peak demand is offset slightly by a higher forecast of load served by self-generation; the revised 2008 forecast includes staff's estimates of effects

from the California Solar Initiative program, which was not established at the time of the *CED 2006* forecast. Figure ES-2 graphically represents the peak forecast.

Figure ES-2: Statewide Non-Coincident Peak Demand

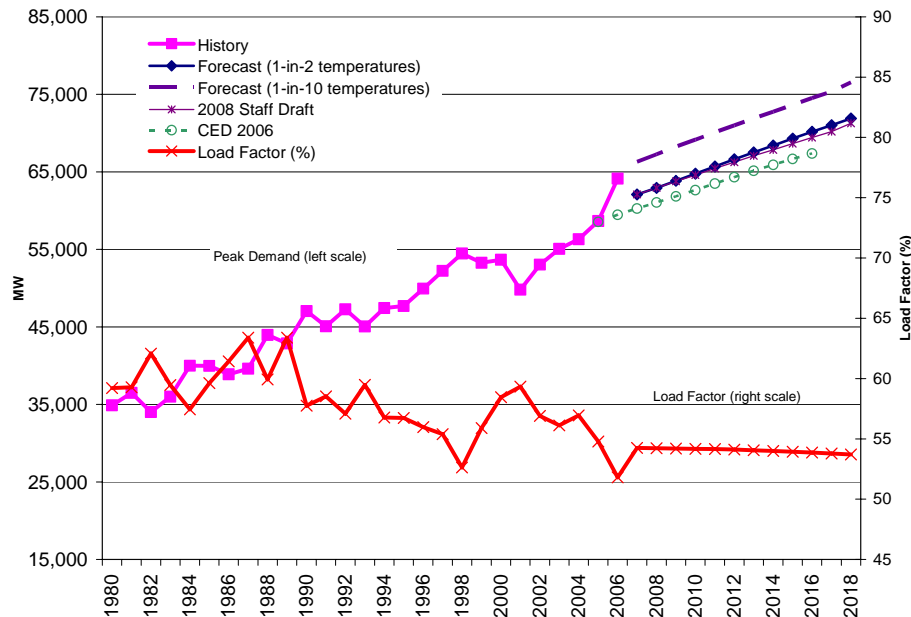


Figure ES-2 also shows the load factor for the state as a whole as well as the estimated 1-in-10 peak temperature scenario. The load factor represents the relationship between average energy demand and peak; a high load factor means the peak is not much higher than average hourly demand. The load factor varies with temperature: in extremely hot years (1998, 2006), actual peak demand shows a sharper increase than would have been observed with average peak weather. The general decline in the load factor over the last 20 years represents a greater proportion of homes in warmer areas and more homes and businesses with central air conditioning. The 1-in-10 temperature scenario estimate represents the projected peak given the 90th percentile of annual maximum temperatures. This is defined as a statewide weighted annual maximum temperature value which theoretically would occur only 1 year out of every 10.

Summary of Revised Utility Area Forecasts

While the revised forecasts are not significantly different at the statewide level, the revised DOF population projections had a noticeable effect for some individual utility areas. The Sacramento Municipal Utility District (SMUD) area forecast was revised downward 9 percent as population previously expected to locate in Sacramento County is now expected to locate in the surrounding areas not served by SMUD. The Southern California Edison (SCE) energy forecast increased by 2.5 percent and the peak forecast by 3.5 percent. The larger increase of the peak forecast reflects the change in population distribution. Within

the SCE area, peak demand is projected to grow 2.3 percent annually in the Riverside-San Bernardino area, but less than 1 percent annually in the coastal areas. A similar pattern is evident in the Pacific Gas & Electric Company (PG&E) planning area. The energy consumption forecast was revised downward 1 percent because of lower population projections overall, but the peak forecast increases slightly because of growth in hotter areas served by PG&E and increased saturation in cooler areas of air conditioners that are only used during peak periods. Peak demand in the Sacramento Valley and foothills area is projected to grow by 2.4 percent annually, while the consumption in the East Bay and Central Coast area forecast is projected to grow at 1.3 percent. Demand in the Central Valley (excluding the Sacramento area) is projected to grow at 1.6 percent. Forecast results by climate zone are reported in the chapters on the SCE and PG&E forecast. Another fast-growing area is that by served the Imperial Irrigation District, with peak demand projected to grow 2.8 percent annually.

The revised annual consumption and peak forecasts for each utility area are shown in tables ES-2 and ES-3.

Table ES-2: Revised Electricity Consumption Forecast by Utility Planning Area

Planning Area Annual Consumption Forecast (GWH)					Annual Growth Rates		
	1990	2005	2008	2018	1990-2005	2005-2008	2008-2018
PG&E	86,803	101,460	107,929	122,336	1.0%	2.1%	1.3%
SMUD	8,358	10,523	11,174	12,851	1.5%	2.0%	1.4%
SCE	82,069	99,261	105,054	121,400	1.3%	1.9%	1.5%
LADWP	23,263	24,638	25,921	27,154	0.4%	1.7%	0.5%
SDG&E	14,926	19,910	21,304	24,567	1.9%	2.3%	1.4%
Burbank-Glendale	2,065	2,201	2,245	2,305	0.4%	0.7%	0.3%
Pasadena	898	1,193	1,253	1,301	1.9%	1.7%	0.4%
Imperial	1,921	3,232	3,413	4,441	3.5%	1.8%	2.7%
CDWR	8,171	8,283	8,865	8,865	0.1%	2.3%	0.0%

Source: California Energy Commission, 2007

Table ES-3: Revised Peak Demand Forecast by Utility Planning Area

Planning Area Annual Consumption Forecast (GWH)					Annual Growth Rates		
	1990	2005	2008	2018	1990-2005	2005-2008	2008-2018
PG&E	17,055	21,435	23,413	26,754	1.5%	3.0%	1.3%
SMUD	2,198	2,964	3,174	3,645	2.0%	2.3%	1.4%
SCE	17,635	21,956	23,272	27,112	1.5%	2.0%	1.5%
LADWP	5,326	5,725	5,717	5,966	0.5%	0.0%	0.4%
SDG&E	2,956	4,003	4,568	5,263	2.0%	4.5%	1.4%
Burbank-Glendale	540	590	600	609	0.6%	0.6%	0.1%
Pasadena	250	292	300	306	1.0%	0.9%	0.2%
Imperial	551	897	1,063	1,395	3.3%	5.8%	2.8%
CDWR	772	783	838	838	0.1%	2.3%	0.0%

Source: California Energy Commission, 2007

Natural Gas Demand

The revised natural gas forecast, shown in Table ES-4, has a higher growth rate than the September 2005 forecast. However, revised historic consumption estimates makes the revised 2008 forecast about 4 percent lower than the September 2005 at the beginning of the forecast period. The increased growth rate of the 2008 forecast relative to September 2005 is because of higher commercial floor space projections. In the revised forecast, the growth rate slows in later years because of rising natural gas prices which reduce commercial and industrial demand. This forecast does not include natural gas used for electric generation.

Table ES-4: Comparison of *CED 2006* Forecast with Staff Draft and Revised Forecasts of Statewide End-User Natural Gas Consumption

Consumption (MM Therms)					
	<i>CED 2006</i>	Staff Draft (June 2007)	Staff Revised (Oct. 2007)	Percent Difference Staff Revised/ <i>CED</i> 2006	Percent Difference Staff Revised/Staff Draft
1990	12,893	12,893	12,893	0.0%	0.0%
2000	13,915	13,915	13,913	0.0%	0.0%
2005	13,550	13,041	13,039	-3.8%	0.0%
2008	13,528	13,970	13,434	-0.7%	-3.8%
2016	13,850	14,625	13,962	0.8%	-4.5%
Annual Average Growth Rates					
1990-2000	0.77%	0.77%	0.76%		
2000-2005	-0.53%	-1.29%	-1.29%		
2005-2008	-0.05%	2.32%	1.00%		
2008-2016	0.30%	0.57%	0.48%		
Historic values are shaded					

Overview of Methods and Assumptions

The staff revised forecast is the product of essentially the same methods used to prepare earlier long-term staff demand forecasts. The commercial, residential, and industrial sector energy models are structural models that attempt to explain how energy is used by process and end use. The forecasts of agricultural and water pumping energy demand are made using econometric methods. After adjusting for historic weather and usage, the annual consumption forecast is used to forecast annual peak demand.

Economic and Demographic Assumptions

Population growth is a key driver for residential energy demand, as well as for commercial growth and demand for water pumping and other services. This forecast uses the California Department of Finance's most recent long-term population forecast, published in July 2007. The draft forecast used the Department of Finance's May 2004 projections. Population is now projected to grow at about 1.2 percent annually. By comparison, statewide population grew an average of 1.3 percent annually from 1990 to 2000. The declining growth rates over the forecast horizon reflect lower rates of fertility and immigration as the population of California and other regions ages. Other economic projections are from Economy.com.

Electricity Rate Projections

The 2005 forecast used rate projections developed by Energy Commission staff, which in general declined over time. For both this revised forecast and the draft

2008 forecast, the sector energy demand was forecasted with future real electricity rates held constant at their current levels. This change to higher forecasted rates, compared with those used in the *CED 2006* forecast, primarily affects commercial and industrial sector demand.

Climate Zone Forecasts

For the revised 2008 forecast, the PG&E and SCE planning area were forecast by several distinct climate zones. The PG&E planning area is divided into five zones and the SCE area into four. All other planning areas constitute one climate zone only. Historically the climate zones were used only to project energy use for heating and cooling equipment; all other end uses were assessed at the utility level. For this forecast, economic and demographic projections by climate zone were used to capture the effects of differential growth in households, income, commercial floor space, and industrial activity.

Conservation Quantification

This forecast report also includes estimates of conservation savings that are included in the baseline forecast. These estimates are made by broad program category. The estimates have been implicitly included in all of the previous forecasts but have not been explicitly identified since the 1990s era of demand forecasts.

CHAPTER 1: INTRODUCTION AND STATEWIDE FORECAST

Introduction

This California Energy Commission (Energy Commission) staff report presents revised 10-year forecasts of electricity and end-user natural gas consumption and peak electricity demand for California, for each major utility planning area, and for the climate zones within each area. The *California Energy Demand 2008–2018* forecast supports the analysis and recommendations of the *2007 Integrated Energy Policy Report (IEPR)*, including electricity and natural gas system assessments and analysis of progress toward energy efficiency, demand response, and renewable energy goals.

The IEPR Committee conducted a workshop on July 10, 2007, to receive public comments on the staff draft forecast.² Staff has revised the forecast to address many of the comments received, as well the direction from the Committee. This report also presents quantification of conservation impacts included in the forecasts. After considering comments on this revised forecast, the Energy Commission may adopt this forecast.

The final forecasts will be used in a number of applications, including Energy Commission energy system assessments and the California Public Utilities Commission (CPUC) 2008 procurement process. The CPUC has identified the IEPR process as “the appropriate venue for considering issues of load forecasting, resource assessment, and scenario analyses to determine the appropriate level and ranges of resource needs for load-serving entities (LSEs) in California.”³ The final forecasts will also be an input to California Independent System Operator (California ISO) controlled grid studies and other transmission planning studies. The *California Gas Report* also uses Energy Commission demand and supply assessments.

Summary of Changes to Current Forecast

The previous long-run forecast, *California Energy Demand 2006–2016*⁴ (*CED 2006*) was based on 2005 peak demand and 2004 energy. In June 2006, staff also published an updated peak demand forecast for 2007 peak demand.⁵ That forecast, combined with the growth rates from the *CED 2006* forecast, was used in many applications, such as the scenario studies for the *2007 IEPR*. For the current

² *California Energy Demand 2008–2018: Staff Draft Forecast*, publication no. CEC-200-2007-015-SD. Forecasts from this report are referred to in this document as the “draft 2008 forecast” or “draft forecast”.

³ Peevey, Assigned Commissioner’s Ruling on Interaction Between the CPUC Long-Term Planning Process and The California Energy Commission Integrated Energy Policy Report Process, September 9, 2004, California Public Utilities Commission Rulemaking 04-04-003.

⁴ California Energy Commission, *California Energy Demand 2006–2016, Staff Energy Demand Forecast, Revised September 2005*, staff final report, publication no. CEC-400-2005-034-SF-ED2.

⁵ California Energy Commission, *Staff Forecast of 2007 Peak Demand*, staff final report, publication no. CEC-200-2006-008-SF, June 2006.

forecast, staff added 2005 and 2006 energy consumption data to the historic series used for forecasting. The peak demand forecast also incorporates recent analysis of 2006 temperatures and peak demand, published in *Staff Forecast of 2008 Peak Demand*.⁶

In the residential sector, appliance saturations have been updated based on more current survey data. This had the effect of increasing air conditioning demand, but lowering some other energy uses. In the commercial sector, staff revised its estimates of existing floor space and projected new floor space using updated economic projections and a new econometric methodology. Both changes increase projected commercial consumption. The energy and peak demand forecasts now include a projection of the impacts from penetration of rooftop solar photovoltaic (PV) systems as stimulated by the California Solar Initiative (CSI).

Changes from the Draft to Final Forecast

For the first time, the entire electricity forecast was prepared by climate zone and sector. For forecasting purposes, the Energy Commission divides the state into 16 climate zones. Historically the climate zones were used only to project heating and cooling demand by climate zone; all other end uses were assessed at the utility level. For this forecast, economic and demographic projections by climate zone were used to capture the effects of differential growth in households, income, commercial floor space, and industrial activity.

The climate zone forecasts were then disaggregated to individual LSEs. As required by Public Resources Code § 25302.5, staff assessed the extent to which load may be transferred among utilities and incorporated that analysis into the LSE forecasts. As part of this analysis, staff used information submitted to the Energy Commission by numerous LSEs based on their expected acquisition of existing customers from the investor-owned utilities (IOUs) and on load growth from areas newly incorporated in their service area.

For demographic projections, the revised forecast used the California Department of Finance's (DOF) new population projections, released in July 2007.⁷ The forecast also used a new end-user natural gas price forecast from the Energy Commission's most recent natural gas assessment. This higher gas price forecast reduces commercial and industrial gas demand.

Since the draft forecast, staff reviewed energy intensity trends for each industry group and modified forecast assumptions to be more consistent with historic trends. Some changes were made to economic drivers based on staff's assessment of their plausibility. For the construction industry, the forecast driver is now the UCLA

⁶ California Energy Commission, *Staff Forecast of 2008 Peak Demand*, staff final report, publication no. CEC-200-2007-006-SF, June 18, 2007.

⁷ State of California, Department of Finance, *Population Projections for California and Its Counties 2000–2050*, Sacramento, California, July 2007.

Anderson School of Business projection of construction sector employment, weighted by the forecast of households in each climate zone.

A number of parties have commented on the plausibility of the declining use per square foot in the commercial sector predicted in the draft forecast. This decline is driven in large part by increasing efficiency in lighting as older systems were replaced. Based on information from the most recent commercial end-use survey, staff concluded that a high proportion of buildings have already retrofitted lighting systems. To more accurately model this trend, the lifetime of lighting equipment was reduced.⁸ Shifting replacement into the historic period increases the commercial consumption forecast.

Statewide Forecast Results

Table 1 presents a comparison of the revised and draft forecasts for select years with the *CED 2006* final forecast used in the *2005 IEPR*. Both the revised and draft energy consumption and peak forecasts are slightly higher than the *CED 2006* forecast over the entire forecast period, primarily because both weather-adjusted peak and electricity consumption were slightly higher than forecasted in *CED 2006*. The draft forecast has a higher growth rate (1.3 percent versus 1.1 percent in *CED 2006*) because of higher projected demand in the residential and commercial sectors. The historic data used for this forecast differs from *CED 2006* because of revised data submitted by utilities and because a detailed review of self-generation consumption data found some data had been misclassified.

Statewide annual peak demand is projected to grow on average 890 megawatts (MW) per year for the next 10 years, or 1.4 percent annually. The peak forecast is about 2 percent higher than *CED 2006*, consistent with the increases made in recent updates in the short-term peak demand forecast. The higher recorded peaks most likely represent the effect of higher saturations of air conditioning than was assumed in the *CED 2006* forecast.

The effect of population growth in the drier, warmer areas of the state increases peak demand—the highest hourly demand in each year—more than it increases annual energy consumption. Another reason for the higher growth rate of the peak demand forecast compared to the consumption forecast is the forecast's assumption that the 2005 federal air conditioning standards have no impact on peak because of their inefficacy in reducing California peak demand.⁹ The seasonal energy efficiency ratio (SEER) performance metric is based on outdoor temperatures far below the average annual maximum temperatures experienced in California and on more humid indoor conditions. Therefore, while the electricity consumption forecast accounts for the 2005 standard's change to SEER 13, impacts from the 2005 standards were not included in the peak demand forecast.

⁸ Commercial sector floor space is affected by Title 24 Building Standards when various remodeling activities take place. Equipment not yet at the end of its useful life may be replaced more quickly than originally planned.

⁹ Southern California Edison, *EER and SEER as Predictors of Seasonal Cooling Performance*, December 15, 2003.

The growth in peak demand is somewhat offset by projected increases in the load served by self generation, reflecting the penetration of rooftop solar PV by programs such as the California Solar Initiative, the New Solar Homes Partnership, and the Self-Generation Incentive Program. The peak demand forecast represents the net amount of load the electric grid must serve so that demand by self-generation reduces the electric system peak. In the forecast, the growth in photovoltaic and other self-generation installations is assumed to reduce peak demand by 650 MW by 2018, based on current costs and program performance; if the installed cost of photovoltaic systems declines rapidly, this projection could easily be exceeded.

**Table 1: Comparison of CED 2006 and Staff Draft
and Revised Forecasts of Statewide Electricity Demand**

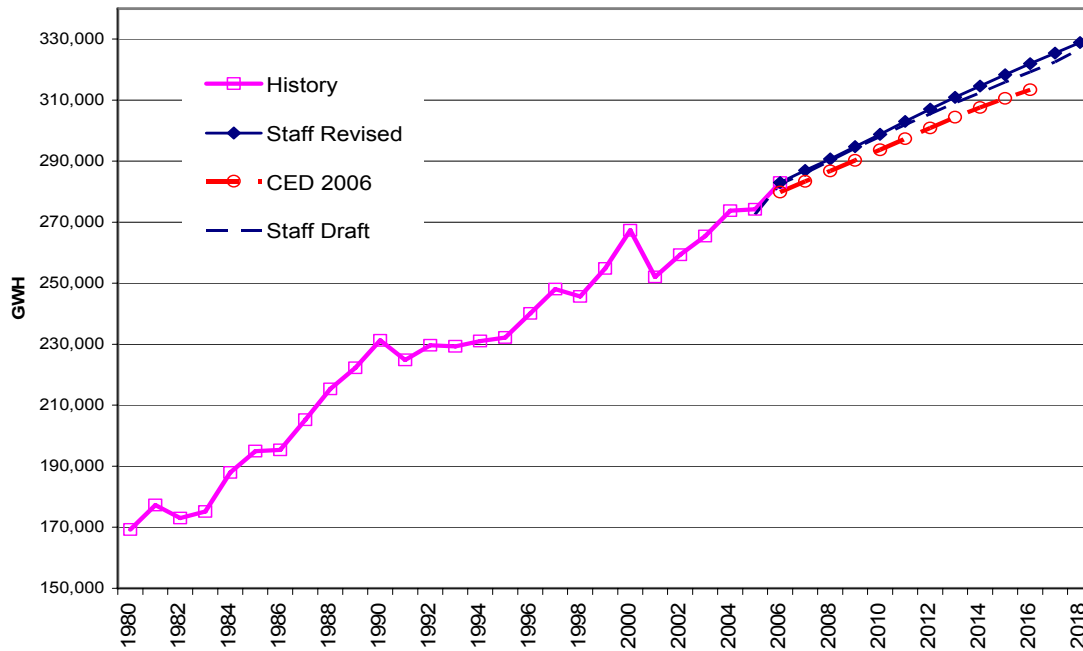
Consumption (GWH)					
	CED 2006 (Sept. 2005)	Staff Draft (July 2007)	Staff Revised (Oct. 2007)	Percent Difference Staff Draft/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	229,375	229,868	229,868	0.22%	0.00%
2000	265,021	265,776	265,769	0.28%	0.00%
2005	276,012	272,491	272,449	-1.28%	-0.02%
2008	286,813	290,187	288,976	1.18%	-0.42%
2013	304,400	309,147	309,148	1.56%	0.00%
2016	313,397	319,331	320,178	1.89%	0.27%
Average Annual Growth Rates					
1990-2000	1.45%	1.46%	1.46%		
2000-2005	0.82%	0.50%	0.50%		
2005-2008	1.29%	2.12%	1.98%		
2008-2016	1.11%	1.20%	1.29%		
Peak (MW)					
	CED 2006 (Sept. 2005)	Staff Draft (July 2007)	Staff Revised (Oct. 2007)	Percent Difference Staff Draft/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	47,431	47,209	47,285	-0.47%	0.16%
2000	54,028	53,661	53,669	-0.68%	0.01%
2005	58,546	58,602	58,646	0.10%	0.07%
2008	61,042	62,935	62,946	3.10%	0.02%
2013	65,144	67,067	67,524	2.95%	0.68%
2016	67,379	69,426	70,174	3.04%	1.08%
Average Annual Growth Rates					
1990-2000	1.31%	1.29%	1.27%		
2000-2005	1.62%	1.78%	1.79%		
2005-2008	1.40%	2.41%	2.39%		
2008-2016	1.24%	1.23%	1.37%		
Historic values are shaded					
GWH=gigawatt-hour					
MW = megawatt					

Source: California Energy Commission, 2007.

Annual Electricity Consumption

The revised statewide electricity consumption forecast, shown in **Figure 1**, is higher than the *CED 2006* forecast over the entire forecast period, although the projected annual growth rate is only slightly higher. The overall increase in the forecast reflects several factors. Higher-than-projected actual consumption in 2005, adjusted for temperature, increased the starting point. Also, the higher level of both projected commercial floor space and personal income increases demand projections.

Figure 1: Statewide Electricity Consumption



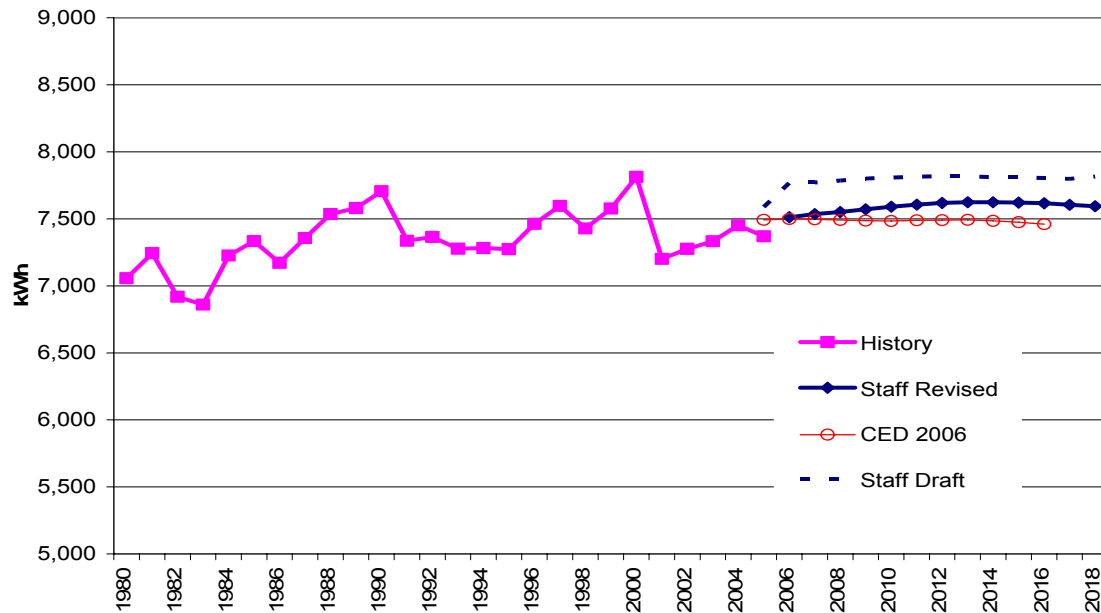
Source: California Energy Commission, 2007.

Per capita electricity consumption, shown in **Figure 2**, is projected to remain relatively constant over the forecast period at just below 7,500 kilowatt hours (kWh) per person. This is about 150 kWh higher than the final *CED 2006* forecast. Per capita consumption has been relatively constant over the past 15 years, fluctuating between 7,200 and 7,800 kWh per person, depending on economic and annual temperature conditions. The revised forecast of per capita use has a lower starting point because actual use in 2006 was lower than forecast.

Figure 3 shows the current and previous forecasts of electricity consumption by the major economic sectors. Over the historic period, the commercial sector has had the highest growth followed by the residential sector. In the forecast period, the residential sector continues to grow at the historic rate (1.7 percent), while the commercial sector slows slightly to 1.4 percent annual growth. The draft commercial sector forecast growth is higher than in *CED 2006* because of staff's revised forecast of commercial floor space, discussed in the methodology section of this chapter. The industrial forecast growth rate is lower because of slightly lower economic projections and because electricity rates are held constant in this forecast, while

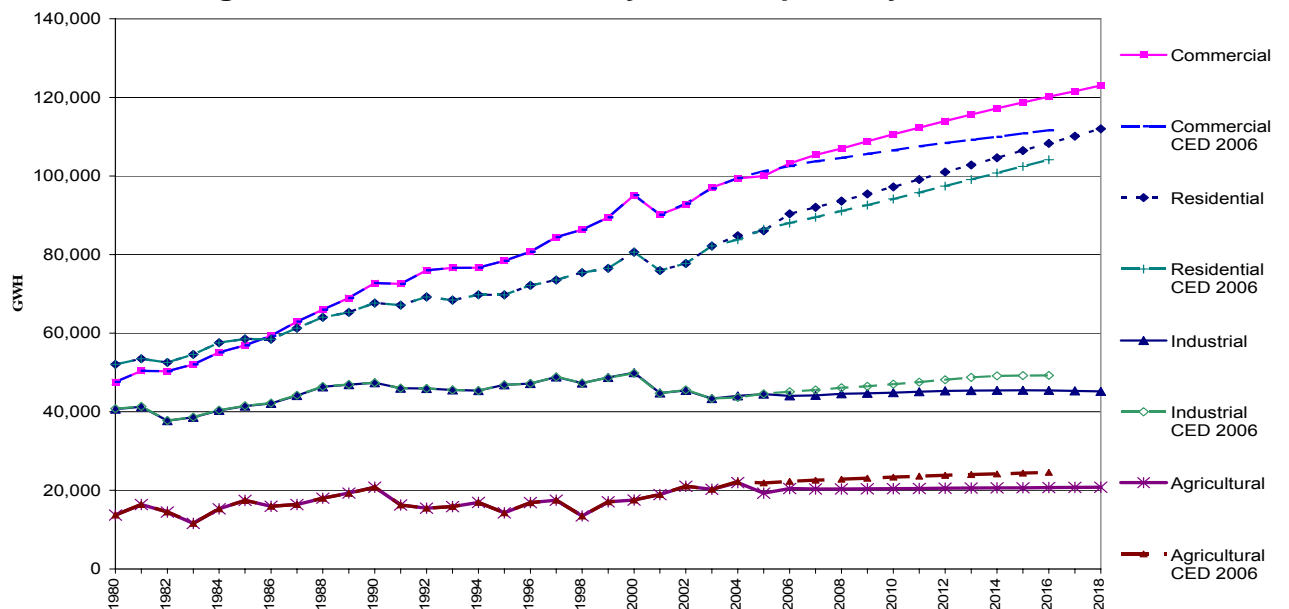
previously rates paid by industry were projected to decline. The agricultural and water pumping forecast is also reduced by the higher rates and because of apparent decreasing energy intensity in the agriculture sector.

Figure 2: Statewide Electricity Consumption per Capita



Source: California Energy Commission, 2007.

Figure 3: Statewide Electricity Consumption by Sector



Source: California Energy Commission, 2007.

To support electricity system analysis, staff disaggregates its planning area and climate zone forecasts to correspond to control areas and congestion zones. **Table 2** shows the forecast of energy required to meet demand by control area and

congestion zone. In the California ISO, demand is projected to be about 1.3 percent annually, with more growth in the Southern California SP-15 area.

Table 2: Net Energy for Load by Control Area (GWH)

	North of Path 15	South of Path 15	CAISO Total	Turlock Irrigati on District	SMUD/ WAPA	LADWP	Imperial Irrigation District
2000	105,123	126,099	224,051	1,584	17,488	27,480	3,040
2007	105,981	127,545	225,500	2,737	18,718	28,904	3,646
2008	115,507	135,563	242,359	2,570	19,773	30,393	3,850
2018	129,765	155,504	275,672	2,958	22,674	31,838	5,007
Annual Growth Rates							
2000-2005	0.16%	0.23%	0.13%	11.55%	1.37%	1.02%	3.70%
2005-2008	2.91%	2.05%	2.43%	-2.07%	1.84%	1.69%	1.83%
2008-2018	1.17%	1.38%	1.30%	1.42%	1.38%	0.47%	2.66%

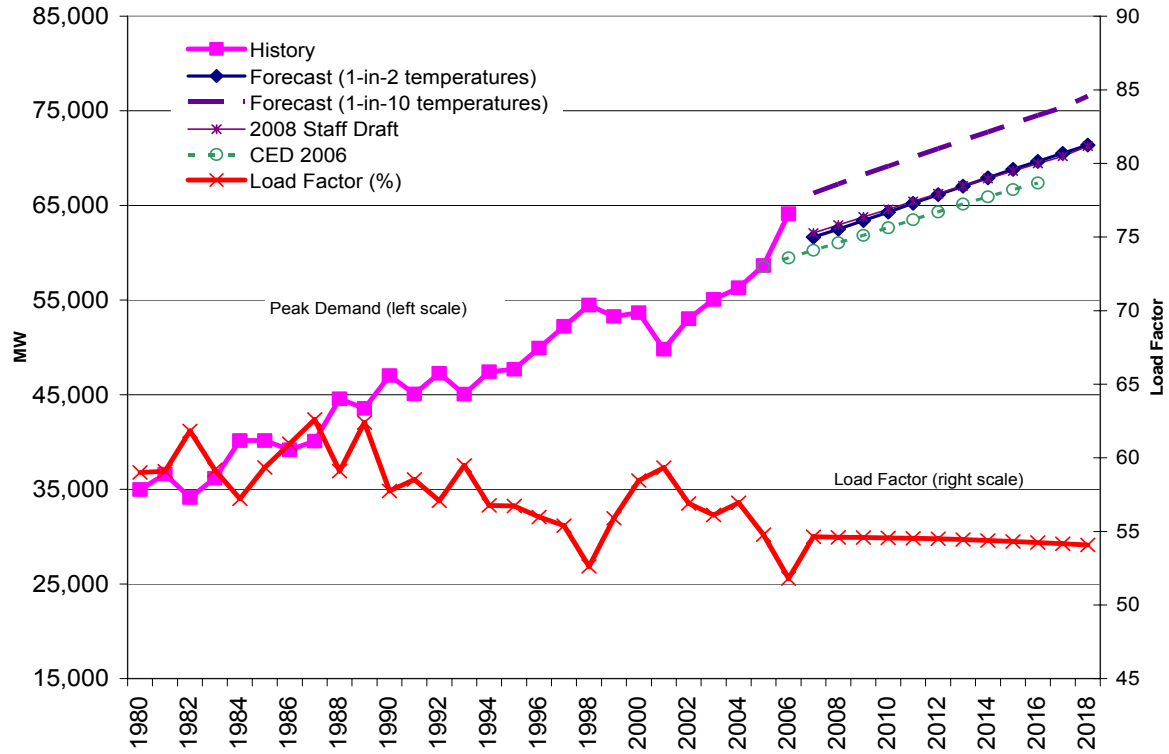
Source: California Energy Commission, 2007.

Statewide Peak Demand

Figure 4 compares the revised forecast of statewide non-coincident peak demand with the draft and *CED 2006* forecasts. Weather-adjusted peak in 2006 proved higher than forecast partly because the saturation of air conditioners increased through 2006. Therefore the revised forecast begins at a higher level, but the growth rates are very similar. Figure 4 also shows the load factor for the state as a whole. The load factor, defined as average demand relative to peak demand, measures the extent to which capacity is being used. A high load factor means the peak is not much higher than average hourly demand. A low load factor means there are very few high loads compared to the average, which is generally the case in California with lots of air conditioning that is turned on when temperatures spike. The load factor varies with temperature; in extremely hot years (1998, 2006) demand has more peaks. The general decline in the load factor over the last 20 years has been caused by a rising proportion of homes in warmer areas and more homes and businesses with central air conditioning. These trends are projected to continue over the forecast period. Energy efficiency measures, such as more efficient residential lighting, can also contribute to the declining load factor by reducing energy use while having a lesser effect on peak.

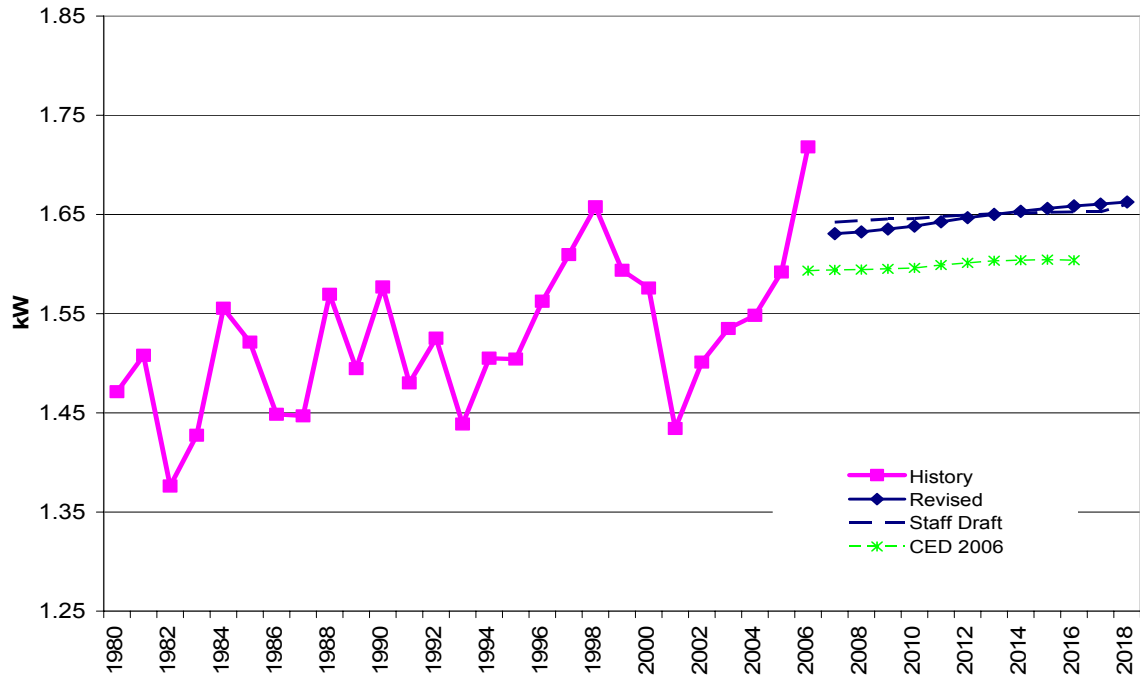
The forecast of per capita non-coincident peak, shown in **Figure 5**, is projected to increase slightly over the forecast period to 1.64 kilowatts per person in 2018.

Figure 4: Statewide Non-Coincident Peak Demand



Source: California Energy Commission, 2007.

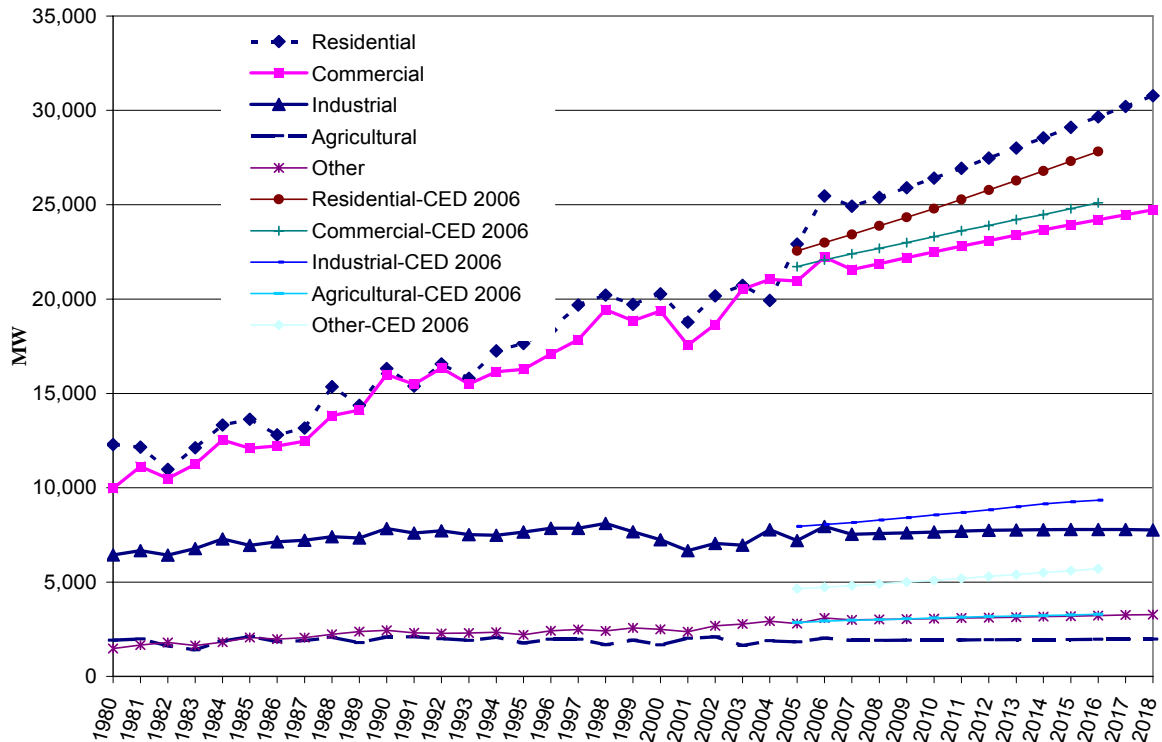
Figure 5: Statewide Non-Coincident Peak Demand per Capita



Source: California Energy Commission, 2007.

Figure 6 shows peak demand by the major economic sectors. As in the energy consumption forecast, residential demand grows fastest at 1.9 percent annually. Commercial sector peak demand grows at 1.3 percent compared to 0.9 percent in *CED 2006* because of a higher floor space forecast and reduced lighting impacts in the forecast period. Industrial peak demand grows at 0.3 percent annually, about the same as industrial energy growth.

Figure 6: Statewide Peak Demand by Sector (MW)



Source: California Energy Commission, 2007

Table 3 shows peak demand by control area. As in the energy forecast, the central and southern parts of the state are growing fastest. The South of Path 15 zone of the California ISO is forecasted to add over 4,000 MW of load by the end of the forecast.

Table 3: Peak Demand (MW) by Control Area

	Total North of Path 15	South of Path 15	CAISO Total	Turlock Irrigation District	SMUD/WA PA	LADWP	Imperial Irrigation District
2000	20,666	23,460	41,729	322	3,765	5,878	704
2005	20,944	26,684	45,113	396	4,239	6,315	897
2008	23,244	28,604	49,071	563	4,727	6,317	1,063
2018	26,400	33,145	56,392	661	5,483	6,575	1,395
Annual Growth Rates							
2000-2005	0.27%	2.61%	1.57%	4.22%	2.40%	1.44%	4.97%
2005-2008	3.53%	2.34%	2.84%	12.44%	3.70%	0.01%	5.83%
2008-2018	1.28%	1.48%	1.40%	1.61%	1.49%	0.40%	2.75%

Source: California Energy Commission, 2007.

Natural Gas Demand Forecast

Table 4 compares the staff revised forecast with the draft and *CED 2006* forecast of end-user natural gas consumption. This forecast does not include natural gas used for electric generation. The revised forecast has a slightly higher growth rate than in *CED 2006*. Most of this increase is in the commercial sector because of the higher estimates of floor space and higher floor space projections. Higher saturations of gas appliances in the residential sector also increase the forecast. The revised forecast is lower than the draft because it incorporates a higher natural price forecast.

Table 4: Statewide End-User Natural Gas Consumption

	<i>CED 2006</i>	Staff Draft	Staff Revised	Percent Difference Staff Draft/ <i>CED 2006</i>	Percent Difference Staff Draft/Staff Revised
1990	12,893	12,893	12,893	0.0%	0.0%
2000	13,915	13,915	13,913	0.0%	0.0%
2005	13,550	13,041	13,039	-3.8%	0.0%
2008	13,528	13,970	13,434	-0.7%	-3.8%
2016	13,850	14,625	13,962	0.8%	-4.5%
Annual Average Growth Rates					
1990-2000	0.77%	0.77%	0.76%		
2000-2005	-0.53%	-1.29%	-1.29%		
2005-2008	-0.05%	2.32%	1.00%		
2005-2016	0.30%	0.57%	0.48%		
Historic values are shaded					

Source: California Energy Commission, 2007.

Methods and Assumptions

The current revised and draft forecast is the product of essentially the same methods used to prepare earlier long-term staff demand forecasts. The specific data sources and assumptions used for this forecast and any changes to methodology since *CED 2006* are described here. A more detailed discussion of forecast methods and data sources is available in the *Methodology Report*.¹⁰

Models for the major economic sectors produce forecasts of annual energy consumption in each utility planning area. After adjusting for historic weather and usage, the annual consumption forecast is used to forecast annual peak demand.

The commercial, residential, and industrial sector energy models are structural models that attempt to explain how energy is used by process and end use. Structural models are critical to enable forecasts to account for the impacts of mandatory energy efficiency standards and other energy efficiency programs that seek to force or encourage adoption of more efficient technologies by end users. This is especially true in the context of the major emphasis upon energy efficiency in California. The forecasts of agricultural and water pumping energy demand are made using econometric methods.

Economic and Demographic Assumptions

Broad economic indicators, such as population, personal income, and jobs, are translated into a variety of specific drivers for each economic sector that have been found to directly explain energy usage. Population growth is a key driver for residential energy demand, as well as for commercial growth and demand for water pumping and other services. This forecast uses the California Department of Finance's most recent long-term population forecast, published in June 2007. The draft forecast used DOF's May 2004 projections.

Figure 7 compares these two population projections. Population is projected to grow at about 1.2 percent annually. By comparison, statewide population grew an average of 1.3 percent annually from 1990 to 2000. The declining growth rates over the forecast horizon reflect lower rates of fertility and immigration as the population of California and other regions ages. Older-age cohorts have a lower propensity to immigrate.

Staff uses Economy.com as the source for many economic projections, including income, employment, and industrial output. **Figure 8** presents a comparison of statewide per capita income. In its May 2007 projections used for this forecast, Economy.com projects a slightly higher rate of growth than in the projections used for *CED 2006*. Personal income is projected to grow at 2.7 percent annually, compared to 2.5 percent in *CED 2006*.

¹⁰ California Energy Commission, *Energy Demand Forecast Methods Report*, publication no. CEC-400-2005-036, June 21, 2005.

Figure 7: Total Statewide Population

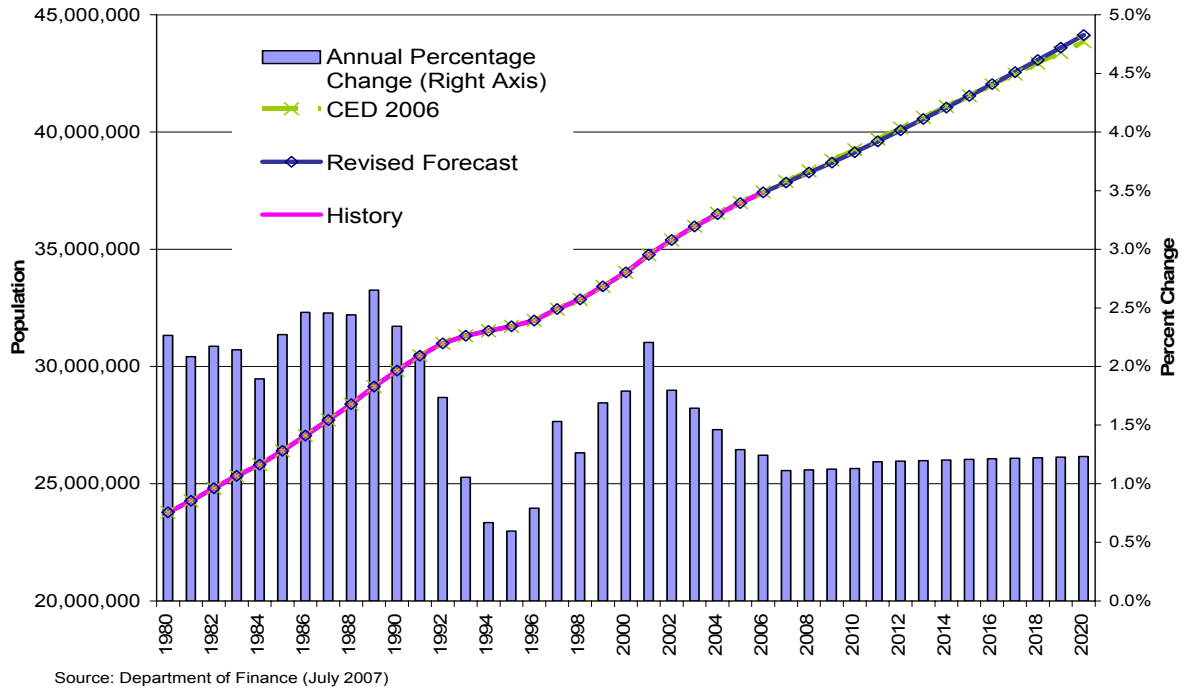
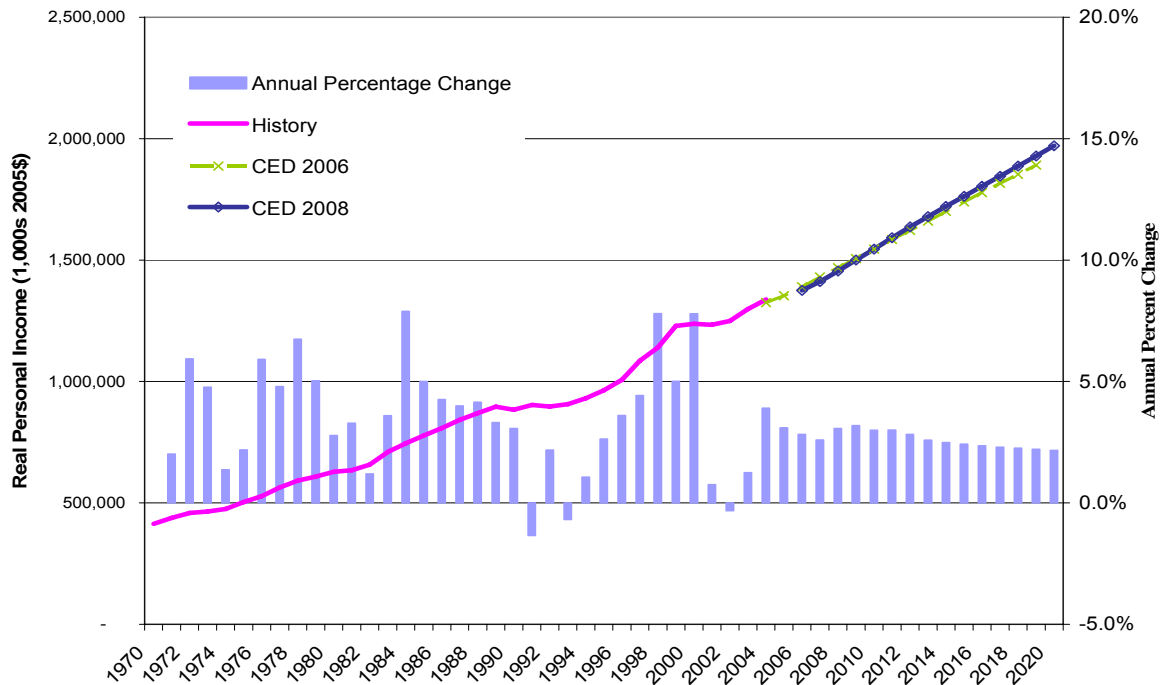


Figure 8: Statewide Personal Income (\$2005)



Electricity Prices

The possible effects of future policy changes in energy efficiency, renewables, siting, or climate change on electricity prices paid by customers are highly uncertain. As in

the draft forecast, sector energy demand was forecasted with future real electricity prices held constant at their current levels. The *CED 2006* forecast used price projections developed by Energy Commission staff based on data provided by utilities, which in general declined over time. At the July 10, 2007 workshop, most participants agreed that holding real prices constant was a more realistic assumption than declining prices. Staff used data provided by each of the major utilities on historic revenues and sales to estimate historic and current revenue per kilowatt hour for each economic sector or rate class. This change from the *CED 2006* forecast to higher forecasted prices primarily affects commercial and industrial sector demand.

Residential End-Use Assumptions

Since the *CED 2006* forecast, staff updated the appliance saturation estimates for all 24 end uses that comprise the residential sector to incorporate the findings of the 2004 Residential Appliance Saturation Survey. Saturation refers to the percentage of homes that have a given end use.

The most dramatic effect of these saturation revisions concerns air conditioning, most specifically, central air conditioning. With the restructuring of the California electricity industry, end-user surveys and other data collection activities were not funded for many years, and the Energy Commission experienced a 10-year hiatus in residential appliance saturation survey activity.

This lack of information means that several cycles of staff forecasts failed to include a major period of retrofitting; many homes that formerly had either a room air conditioner or no air conditioning at all have since had a central system installed. For example, in recent previous forecasts of the Sacramento Municipal Utility District (SMUD) service territory, staff estimated that approximately 70 percent of single family homes had a central air conditioning system. Based on the new Residential Appliance Saturation Survey, staff now estimates that close to 95 percent of single family homes in the SMUD service territory, and many other parts of the Central Valley, have central air conditioning. Staff's corrected estimates drive an increase in forecasted peak load, due to the nearly complete saturation of air conditioning in warmer climates.

More temperate climates are becoming increasingly dependent upon air conditioning too. Staff estimates that Pacific Gas & Electric Company's (PG&E's) climate zone 4, which surrounds San Francisco and includes Santa Rosa and San Jose, has a central air conditioning saturation of nearly 50 percent—double previous saturation estimates. More than 75 percent of new single family homes in climate zone 4 are projected to have central air conditioning.

This increase in electricity consumption from higher air conditioning activity is balanced somewhat by the effect of revised saturation estimates for natural gas appliances. The trend toward use of natural gas instead of electricity for cooking, water heating, and space heating produces a higher forecast of gas consumption in every utility service area.

Commercial Sector Assumptions

Energy use in the commercial sector is modeled in terms of energy use, for each end use, per square foot for 12 different building types. A forecast of floor space in each county serves as the economic driver of demand trends. For this forecast, staff made significant changes to the methods and data used for forecasting floor space and vacancy rates.

The historic floor space stock estimates were revised based on analysis of the McGraw Hill database of permits for new buildings and floor space additions from 1970 through 2005, by county. Staff created a time series of floor space stock (rather than additions) by allowing additions to decay as they age, in concert with the logistic survival formula:

$$Survival(\text{age } t) = \frac{e^v}{1 + e^v} \quad \text{where } v = 6.912 \left(1 - \frac{t}{\text{median life}}\right).$$

Logistic survival posits that few buildings are torn down in their early years and that tear-downs accelerate as buildings approach their average lifetime, then slow down again as fewer old buildings remain.

For *CED 2006*, the projection of future floor space additions was based on historic average growth in floor space. For the current revised and draft forecast, staff developed an econometric method for forecasting growth in floor space. For each building type, staff identified the economic or demographic variable that best correlates with energy use over time. Those variables are shown in **Table 5**. Since the draft forecast, the floor space forecast was re-estimated with the new DOF population projections.

Table 5: Economic/Demographic Variables Specified for Each Building Type

Building Type	Variables
Small Office	Employment in finance, information, and government sectors; personal income; population
Large Office	Employment in finance, information, and government; personal income; population
Restaurant	Employment in services; per capita income; population
Retail	Employment in retail; personal income; population
Grocery	Employment in retail; personal income; population
Warehouse	Employment in food manufacturing; employment in wholesale; population
Refrigerated Warehouse	Employment in food manufacturing; employment in wholesale; population
School	Population aged 5-17; personal income; population
College	Population aged 18-24; personal income; population
Hospital	Employment in health/education; population aged 65 and higher; population
Hotel	Employment in leisure activities; per capita income; population
Miscellaneous	Per capita income; personal income; population

Source: California Energy Commission, 2007.

To develop a relationship between floor space and the economic/demographic variables, changes in floor space from year to year for each building type and climate zone for the period 1980–2005 were regressed on three relevant economic/demographic variables, current and lagged, as follows:

$$\begin{aligned}\Delta FS = & a + b_1\Delta D_1 + b_2\Delta D_{1-1} + b_3\Delta D_{1-2} + b_4\Delta D_{1-3} \\ & b_5\Delta D_2 + b_6\Delta D_{2-1} + b_7\Delta D_{2-2} + b_8\Delta D_{2-3} \\ & b_9\Delta D_3 + b_{10}\Delta D_{3-1} + b_{11}\Delta D_{3-2} + b_{12}\Delta D_{3-3} + \varepsilon\end{aligned}$$

where ΔFS is change in floor space from year $t-1$ to year t and ΔD is the current or lagged annual change in an economic/demographic variable. Changes were used rather than levels to avoid autocorrelation problems. Lagged variables were included to account for time delay between a change in the state's economy and demographics and a response in terms of new construction.

Individual variables ΔD were eliminated from the estimation if they did not reduce the regression's standard error. As an example, the change in hotel floor space in each climate zone was specified as a function of changes in projected leisure jobs, income per capita, and population (and their lags). After eliminating insignificant variables, the final regression for climate zone 2 included current per capita income and population, per capita income lagged two periods, and population lagged three periods; for climate zone 3, the final regression included only current per capita income and population.

Using the regression results, floor space for each building type and climate zone was forecasted using economic and demographic projections from Economy.com and the California Department of Finance. Annual floor space additions were calculated by subtracting estimated building decay from year-to-year changes in projected floor space.

Vacancy rates for both historical and forecast years were estimated using data on office building vacancies by county for 1984–2005. Vacancy rates were specified as a function of the rate of net building additions and growth in employment in office related jobs (government, information, and finance). Regression yielded the following:

$$\text{Vacancy rate}(t) = 14.66 + 42.27 \times \text{additions rate}(t) - 34.73 \times \text{employment growth}(t)$$

with both explanatory variables statistically significant at a 95 percent confidence level. This estimated relationship was used to project vacancy rates for all building types, with employment growth in office-related employment replaced by a growth indicator relevant to the particular building type. For example, growth in projected retail employment was used in the case of retail buildings, and growth in school age population was used for schools.

Conservation in Commission Demand Forecast Models

Energy Commission demand forecasts seek to account for all conservation that is "reasonably expected to occur." Since the 1985 *Electricity Report*, conservation programs that are reasonably expected to occur have been split into two types: committed and uncommitted. This demand forecast continues that distinction. "Committed" programs are defined as programs that have been implemented or for which funding has been approved. While "conservation reasonably expected to occur" includes both committed and uncommitted programs, only the effects of committed programs are included in the demand forecast. The uncommitted demand side management (DSM) forecast of load impacts from programs or other actions is treated as a resource to allow comparison of DSM to other resource options. Long-term "stretch" goals for a series of programs that are not funded are considered uncommitted.

A difficulty arises in correctly projecting uncommitted impacts versus market effects, standards effect, and savings from public or utility programs that are captured in forecast models. Building and appliance standards are modeled within the residential and commercial forecast models. The models account for building decay, equipment replacement, and market-induced impacts. Some DSM programs sponsored by utilities, state government, local government, and other organizations are also modeled within the sector models. In addition, as models are calibrated to historic actual data, they implicitly account for the effects of many years of energy efficiency programs. Therefore, the forecasts may include some impacts associated with the historic and ongoing levels of programs to the extent they represent impacts associated with replacement of aging building stock and equipment or installation of new stock and equipment at efficiency levels that comply with current building and appliance standards. "Uncommitted effects" are thus defined as the incremental impacts of the level of future programs (for example, savings associated with new equipment that exceeds current standards or early replacement of existing stock), impacts of new programs, and impacts from expansion of current programs.

At the July 10, 2007 workshop, several utilities articulated the need to better understand the conservation embedded in the Energy Commission's forecast to avoid including in resource plans uncommitted savings that are already accounted for in the forecast. To address this issue, staff prepared estimates of conservation impacts for each utility planning area.

Attribution of savings from standards is guided by the principle that program savings are determined in the reverse order of introduction. This chronological sequencing approach requires that a series of model runs be made. For example, the effects of the 2005 building standards were calculated by comparing energy use with those standards in effect (the baseline forecast) to what energy use would have been under the prevailing 1998 building standards. The difference between the baseline forecast and a model run with the 2005 standards removed is the impact attributed to the 2005 standards. Similarly, the effect of the 1998 standards was calculated by comparing the energy use of buildings that comply with the standards to the prevailing practice prior to their implementation. When all building and appliance

standards are removed, only market or price effects remain. Finally, prices are held constant from 1977 forward, producing an estimate of demand with no standards or price effects.

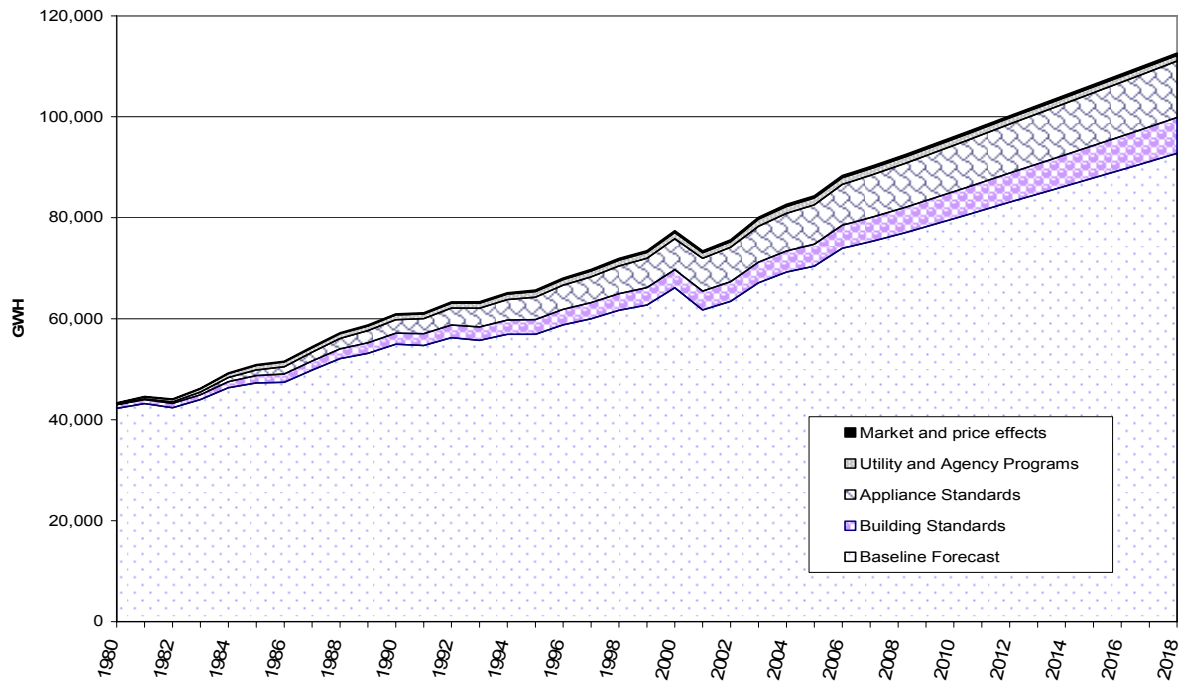
A significant complication of implementing this convention is the attribution of savings to market forces, including direct consumer price response. Because the models runs quantifying standards effects use fuel price assumptions from the baseline forecast, the estimated savings are conditional upon the market savings, which depend upon the fuel price assumptions of the baseline forecast. Changes in such fuel price assumptions, all other effects held constant, change the savings quantified for each program. High fuel prices lead to lower program savings and lower fuel prices lead to higher program savings.

The impacts from many utilities and government programs are also estimated directly within the end use models. However, because of the large number of programs and the extreme difficulty in attributing impacts to particular programs, no attempt is made to attribute impacts through an iterative process. Estimated savings by program are obtained directly from utilities and public agencies. At the aggregate, the utility and program estimates are used to gauge the impacts included within the end use models.

Estimates of impacts calculated outside the sector models are the product of a three step process. First, first-year impacts are assigned a useful measure life. Second, a degradation factor is applied to each year of the useful life to account for poor maintenance or equipment failure. Third, the final results are aggregated and provided to the summary model where they are used to evaluate the sector forecasts. Explicit adjustments are made only to those programs whose effects are not likely to be captured by other model effects.

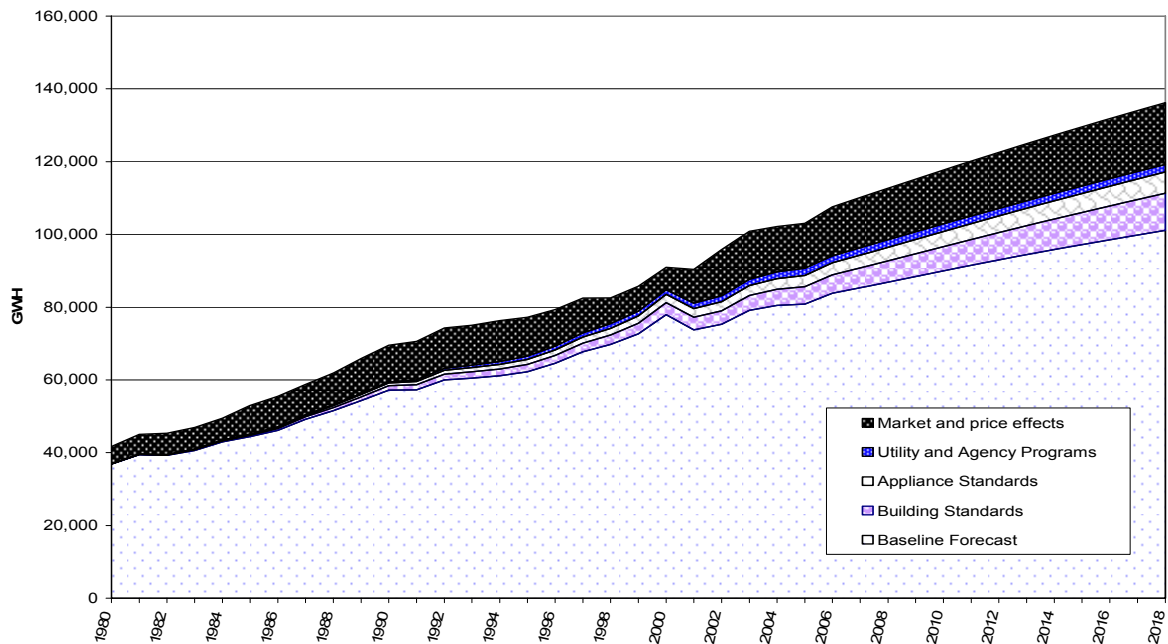
Figures 9 and 10 illustrate the commercial and residential results for the three IOUs combined. The bottom area represents the staff-revised demand forecast. Each area above the forecast represents the savings from that category—the amount by which it is estimated consumption would have increased if those requirements were eliminated. For example, the estimated impacts of residential building standards are over 7,000 GWH by 2018, meaning elimination of the standards from the residential forecast model increased projected consumption by that amount. The upper line represents estimated consumption when all standards and programs are removed from the model and electricity prices are held constant. Because of greater price elasticity, market effects are more significant in the commercial sector.

Figure 9: Estimated IOU Residential Consumption and Conservation Impacts (GWH)



Source: California Energy Commission, 2007.

Figure 10: Estimated IOU Commercial Consumption and Conservation Impacts (GWH)



Source: California Energy Commission, 2007.

Table 6 summarizes the estimated residential and commercial conservation impacts for selected years for the three IOUs: PG&E, Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E). Results for each utility can found in the planning area chapter.

Table 6: Estimates of Commercial and Residential Conservation Impacts for PG&E, SCE, and SDG&E

	Residential Energy Savings (GWH)				Commercial Energy Savings (GWH)				Total Energy Savings
	Building & Appliance Standards	Utility and Public Agency Programs	Market and Price Effects	Total	Building & Appliance Standards	Utility and Public Agency Programs	Market and Price Effects	Total	
1990	5,740	994	253	6,987	2,499	398	12,109	15,006	21,993
2000	11,650	1,308	413	13,371	6,736	1,358	8,259	16,353	29,724
2005	14,615	1,416	447	16,478	9,572	1,987	13,724	25,283	41,761
2008	16,336	1,355	458	18,149	11,682	2,132	15,420	29,234	47,383
2013	18,977	1,256	476	20,709	15,563	2,094	17,135	34,792	55,501
2018	21,533	1,186	497	23,216	19,608	2,052	18,447	40,108	63,323
	Residential Peak Savings (MW)				Commercial Peak Savings (MW)				Total Peak Savings
	Building & Appliance Standards	Utility and Public Agency Programs	Market and Price Effects	Total	Building & Appliance Standards	Utility and Public Agency Programs	Market and Price Effects	Total	
1990	1,717	325	56	2,099	460	62	2,303	2,825	4,924
2000	3,066	426	92	3,584	1,279	256	1,409	2,943	6,527
2005	3,772	501	100	4,373	1,807	378	2,846	5,032	9,405
2008	4,121	489	102	4,713	2,195	406	3,248	5,849	10,562
2013	4,677	451	106	5,235	2,928	399	3,610	6,937	12,171
2018	5,277	425	111	5,814	3,697	391	3,899	7,986	13,800

Source: California Energy Commission, 2007.

These results represent impacts only in the residential and commercial sectors, about two-thirds of consumption. The Energy Commission's industrial, agriculture, and other sector forecasts do not model conservation effects explicitly. In these models the forecast is driven by econometric or other statistical analysis of historic energy intensity trends. All conservation impacts through the last historic year are by definition accounted for, and the projected trends incorporate effects of past energy efficiency programs on usage, as well as price or market effects. The industrial sector overall has shown large decreases in energy intensity in many industries that far exceed utility estimates of program savings for that sector.

Investor-Owned Utility Energy Efficiency Goals for 2006-2008

For the IOUs, committed conservation programs are those programs included in the 2006–2008 program plans approved in the CPUC Energy Efficiency Rulemaking Proceeding (R04-06-010) or in other CPUC decisions. In decision D.04-09-060, the CPUC established numerical goals for electricity and natural gas savings for the

IOUs for the period 2004–2013.¹¹ D.04-09-060 implements a core component of the *Energy Action Plan*, which was earlier adopted by the CPUC, the California Energy Commission, and the California Consumer Power and Conservation Financing Authority. The decision translated that mandate into explicit, numerical goals for reducing electricity and natural gas consumption as well as peak demand. Savings from energy efficiency programs funded by the public goods charge and procurement rates will contribute to these goals, including those achieved through the Low-Income Efficiency Program.

To account for these goals in the forecast, staff used the impacts by sector or program category provided by each utility in its 2007 *IEPR* demand forecast submittal. The electricity program savings goals used for each IOU are shown in **Table 7**. The planned programs and estimated impacts are evaluated, and only the effects of those programs which are not already captured in the models are included in the forecast. The resulting forecast of efficiency impacts was then used to adjust the raw residential and commercial demand forecasts.

Table 7: First Year Impacts of 2004–2008 Energy Efficiency Goals

	PG&E		SCE		SDG&E	
	GWh	MW	GWh	MW	GWh	MW
2004	744	161	826	179	268	58
2005	744	161	826	179	268	58
2006	829	180	922	200	281	61
2007	944	205	1046	227	285	62
2008	1053	229	1167	253	284	62

Investor-Owned Utility Energy Efficiency Goals for 2006-2008

Because the post-2008 goals and program strategies are currently under review at the CPUC, they are not explicitly accounted for in this forecast. However, staff's assessment is that historically many of the effects of utility programs are indirectly accounted for in the models. For the programs implemented in 2006-2008, staff estimates that approximately 80 to 90 percent of the expected impacts are reflected in the models in other ways. This assessment of significant overlap is specific to the 2006-2008 program mix which heavily targets end-uses also affected by codes and standards (such as refrigerators and commercial lighting). If the current program mix and level of effectiveness is unchanged this level of overlap would be expected to continue in future years.

There are two important reasons why the explicit adjustment to the forecast is so small. First, much of this overlap is associated with effects that in staff's assessment are captured by other model assumptions. So the impacts are real, but they are attributed to standards, not programs. For example, in staff's commercial forecasting model, lighting intensity in large offices declines by 10 percent between 2009 and 2013 as standards are applied to buildings being replaced or retrofit. The current

¹¹ California Public Utilities Commission, *Interim Opinion: Energy Savings Goals for Program Year 2006 and Beyond*, D. 04-09-040, September 23, 2004, in Energy Efficiency Rulemaking 01-08-028.

IOU program mix also emphasizes commercial lighting. In reality, lighting systems may be retrofit before the building reaches the model decay threshold, but this effect is not represented in staff's models. Also, the CPUC allows credit toward the goals of codes and standards compliance efforts by the IOUs. Finally, the process of calibration to historic data adjusts the forecast for actual impacts without attribution to any specific program or standard.

The second reason relates to projected program savings versus actual impacts. Historically, verified program impacts have been found to be significantly less than projected program savings. Therefore, if actual utility savings have been, for example, 70 percent of planned savings, the forecast is calibrated to a trend with that lower level of impact (that is, a higher energy intensity trend), and the forecast assumes a similar trend for the future. If future programs are more effective, that will be an incremental reduction to the forecast. (This would also mean less cost-effective potential has been achieved, and therefore more remains available for the future).

These overlaps would be expected to continue for post-2008 program expenditures, unless the post-2008 program designs change in substantial ways, for example by devising programs emphasizing measures which produce effects that are not captured currently within the forecasting models. The direction laid out in the September 17, 2007 proposed CPUC decision¹² indicates a significant change of direction. This decision is not final and many of the new approaches discussed could take years to produce noticeable results, but it seems likely that the post-2008 program plans will reflect a change in emphasis to targeting, for example, new construction and air conditioning rather than lighting. This change in program mix would translate to a greater explicit impact on the staff forecast. Also, the new structure of financial risks and rewards for IOU's presented in the CPUC's September 20, 2007 proposed decision¹³ could increase program effectiveness above historic levels. Also, future program strategies may place a greater emphasis on total long term savings as opposed to near-term annual impacts, in which case the current annual targets are not a good indicator of the pattern of future savings.

The overlap between staff forecast assumptions and currently uncommitted program effects is likely to decrease in the post-2008 period, but cannot be appropriately assessed until specific program plans are developed. Users of the forecast can assume it includes a minimum level of future impacts consistent with 'business as usual' program mix and delivery. When the 2009-2011 programs are approved, staff will evaluate them and prepare appropriate adjustments to the next forecast.

¹² California Public Utilities Commission, *Interim Order on Issues Relating To Future Savings Goals And Program Planning For 2009-2011 Energy Efficiency And Beyond*, September 17, 2007.

¹³ California Public Utilities Commission, *Proposed Decision D.07-09-043*, September 20, 2007.

Self-Generation Program Impacts

This forecast accounts for effects of two program areas designed to promote self-generation: the California Self-Generation Incentive Program (SGIP) and the CSI programs, including the CPUC-administered CSI, along with the Energy Commission New Solar Home Partnership and the Emerging Renewable Program that has been administered by the California Energy Commission.

The general strategy of the Emerging Renewable Program and CSI programs is to encourage demand for solar PV arrays with financial incentives until the size of the market increases to the point where economies of scale are achieved and capital costs decline. As PV production capacity comes on line in the next few years, production and hence the price of PV installations are expected to decline. However, the extent to which consumers see real price declines will depend on the interplay of supplier expectations, the future level of incentives, and demand as manifested by the number of states or countries offering subsidies for PV. For example, when the Emerging Renewable Program was established, the expectation was that the subsidy would only be necessary for a few years. Then Germany offered an incentive, driving up demand in excess of the production increase. Many states and nations currently have no solar programs; therefore, the possibility of similar future effects seems very possible. Given the uncertainty of the timing and magnitude of future PV price changes, staff assumed that the recent rate of installations would continue through the forecast period. This projection may prove to be conservative but is consistent both with current demand and the current stock of businesses in California selling and installing PV systems.

Some technical assumptions about PV system performance were derived from the recent Energy Commission report, *Scenario Analysis of California's Electricity System (Scenario Report)*.¹⁴ Since the draft forecast, staff recalculated the dependable coincident peak using the Energy Commission forecasting definition of peak: mid June–mid September. The factors used for the draft forecast used a longer definition of summer (May through October). Using the shorter summer definition results in higher expected peak impacts per kilowatt (kW) of installed capacity.

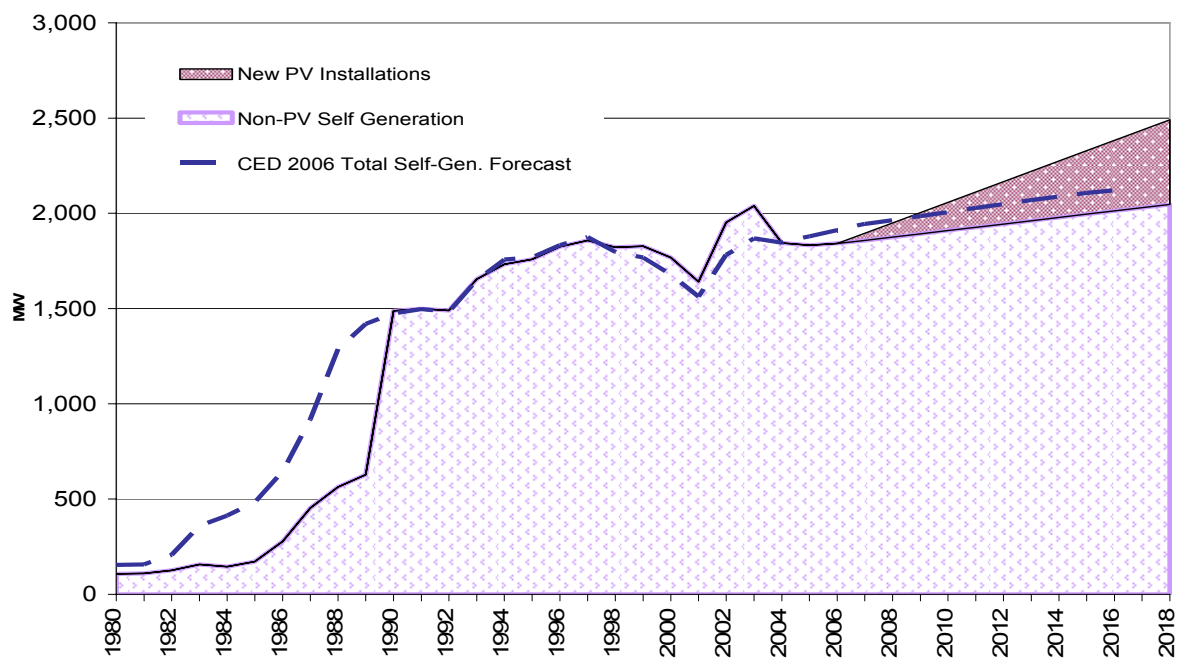
Assembly Bill 970 (Ducheny/Battin, Chapter 329, Statutes of 2000) required the CPUC to initiate load control and distributed generation program activities designed to produce significant public benefits. On March 27, 2001, the CPUC issued Decision 01-03-073 mandating a self-generation program in the service territories of California's investor-owned utilities. The SGIP offers financial incentives to customers of IOUs who install certain types of distributed generation facilities to meet all or a portion of their energy needs. The program began in mid-2001 and is scheduled to continue offering incentives for completed projects through the end of 2011.

¹⁴ PV characteristics are described in Appendices E and G of the California Energy Commission *Scenario Analysis of California's Electricity System: Preliminary Results for the 2007 IEPR*, staff draft report, publication no. CEC-200-2007-010-SD, June 8, 2007.

To forecast future self-generation load, staff used the IOU reports on completed new interconnections and pending applications to develop projections of capacity additions of new interconnections.¹⁵ The interconnection reports provide a detailed picture of capacity addition trends. To translate self-generation capacity into effects on system peak demand requires assumptions about load shape, the coincidence of self-generation peak with system peak, and the extent to which self-generation units are operating during peak hours. Staff used the evaluation studies of the SGIP program for these assumptions.¹⁶ For example, the 2004 study found that the load impact at the time of the 2004 California ISO peak was 58 MW out of 103 MW of installed capacity. As in the previous forecast, it is assumed that new additions will continue at the current rate through the life of the SGIP program. After 2011, self-generated loads are assumed to grow at the rate of the utilities' noncommercial sector. The revised forecast is slightly higher than in *CED 2006* with a peak impact of 2,048 MW by 2018.

Figure 11 shows the combined impact of the SGIP and CSI forecasts. Together, they may serve load of 2,500 MW by 2018. These projections represent the available capacity at the time of the system peak.

Figure 11: Forecast of Peak Impacts of CSI and SGIP



Source: California Energy Commission, 2007.

¹⁵ http://www.sdenergy.org/uploads/Selfgen_Statewide_Data_Apr07.xls.

¹⁶ ITRON, *CPUC Self-Generation Incentive Program Fourth-Year Impact Report*, final report, submitted to Southern California Edison and The Self-Generation Incentive Program Working Group, April 15, 2005.

Demand Response

The term “demand response” encompasses a variety of programs, including traditional direct control (interruptible) programs and new price-responsive demand programs. A key distinction is whether the program is dispatchable. Dispatchable programs, such as direct control, interruptible tariffs, or demand bidding programs, have triggering conditions that are not under the control of and cannot be anticipated by the customer. Energy or peak load saved from dispatchable programs is treated as a resource and therefore not accounted for in the demand forecast. Nondispatchable programs are not activated using a predetermined threshold condition, but allow the customer to make the economic choice whether to modify its usage in response to ongoing price signals. Impacts from committed nondispatchable programs should be included in the demand forecast.

At this time, all of the existing demand response programs have some form of triggering condition. Although the utility or California ISO may not have direct control, the customer only has the opportunity to participate in the program when the program operator has called an event, whether because of high market prices or resource scarcity. Therefore, in this forecast, no demand response impacts are counted on the demand side.

Historic Electricity Consumption Estimates

Energy Commission demand forecasting models are organized by sector according to economic activity (that is, commercial, industrial, agricultural, and so forth). Each of these forecasting models develops a forecast based on sub-activities within the sector (such as commercial building type or industrial activity). Under the Energy Commission’s Quarterly Fuel and Reporting (QFER) regulations, each LSE is required to file monthly and annual reports that document energy consumption by activity group. In the past, this reporting was to conform to the Standard Industrial Classification (SIC) system. This system was revised to the North American Industrial Classification System (NAICS).¹⁷ The switch to NAICS has caused some difficulty in identifying the appropriate economic classification of many energy users. The result of this change, along with the lack of reporting regulation adherence by various LSEs, is a lower quality of the Energy Commission’s historical record of sector-specific consumption. Unclassified sales—consumption which the LSE has not identified by an NAICS category and that staff therefore cannot map to a customer sector—has become the fastest growing category of consumption reported to the Energy Commission.

The largest increase coincided with the advent of the restructured electric industry. Under current reporting requirements, the IOUs are required to identify the economic classification of direct access customers and provide that information to the direct

¹⁷ As a result of North American Free Trade Agreement (NAFTA), the federal government replaced the SIC system with the NAICS system. In turn, the Energy Commission modified its regulations requiring utilities to classify all end users from SIC to NAICS to allow economic data to be matched to utility consumption data.

access provider. Much of the increase in unclassified sales is among direct access customers identified by the IOUs as “unclassified.” Staff allocated unclassified sales to economic sectors using professional judgment. In the current forecast, unclassified sales were allocated to sectors to adjust for unrealistic changes in historic consumption. The *CED 2006* forecast allocated unclassified sales in the summary model as a post-sector model adjustment. This change in allocation method has some impact on the commercial model results. If staff does not know more precisely how much electricity each economic sector is really using, it cannot correctly quantify the effects of energy efficiency programs or standards on demand or apply the correct load shapes for forecasting peak. The forecast may be over- or underestimating demand growth, depending on the true distribution of unclassified sale among sectors that have distinctly different underlying patterns of growth

Climate Zone Demand Forecasts

Many of the uses of demand forecasts require forecasts prepared at a finer geographic resolution than the planning area forecasts the Energy Commission has historically produced. Electricity system analysis requires identification of load by congestion zone or load pocket. Evaluation of progress toward renewable energy goals requires sales data by individual LSEs. Development of energy efficiency goals requires projections of per capita sales by LSEs. Controlled grid studies require forecasts for each LSE, sometimes with geographic subdivisions. To satisfy the needs of the California ISO, utilities, and Energy Commission studies, staff has been allocating planning area results to California ISO zones. To improve upon this, the fundamental basis for the forecast needs to be more geographically disaggregate. With this forecast cycle, the staff has begun the development of climate zone forecasts. The SCE planning area is composed of four distinct climate zones: Zone 7 (southern San Joaquin Valley); Zone 8 (coastal part of Los Angeles Basin served by SCE); Zone 9 (inland part of the Los Angeles Basin served by SCE); and Zone 10 (Inland Empire). The PG&E planning area is composed of five distinct climate zones: Zone 1 (North Coast and Eastern Mountain); Zone 2 (Sacramento area served by PG&E); Zone 3 (northern San Joaquin and northern Sacramento Valley); Zone 4 (East Bay/ Central Coast); and Zone 5 (San Francisco Bay). All other planning areas constitute one climate zone only.

The historic consumption and economic and demographic projections for the residential and commercial sectors were aggregated so that projected growth in each climate zone reflects the distinct economic trends and climate of that area. Because industrial sector is not weather-sensitive, economic drivers were developed for two regions each in the SCE and PG&E areas. For other sectors where the forecast is driven by household growth, a planning area forecast was distributed to climate zone based on the projected share of households in each zone. Area forecasts for other sectors that are neither weather-sensitive nor driven by population trends, such as agricultural water pumping, were distributed to climate zones based on historic consumption.

To develop forecasts for specific control areas and congestion zones, the climate zone forecasts were then used to develop forecasts for LSEs by climate zone. Demand for individual LSEs is projected initially based on the sector growth rates of the climate zones in which they are located. The individual LSE forecasts were also adjusted to account for load migration (customers migrating from one service provider to another) and for areas newly incorporated as municipalities. Staff used data provided by numerous LSEs on expected migration. Where the raw forecast based on climate zone trends did not capture projected migration or municipalization, the gaining LSE's forecasted share of energy was increased, while the losing LSE's share of demand was decreased. The LSE-climate zone peak demand forecast was developed by applying climate zone load factors to the forecasted energy. Where the starting point of the forecast was inconsistent with staff's estimate of weather-adjusted 2006 peak demand for that LSE, the load factors for the LSEs were adjusted.

The statewide forms following this chapter include the forecast by climate zone, control area, and LSE. Subsequent chapters present the forecast for each of the major electric planning areas and for each climate zone and forms with detailed forecast results, followed by a chapter on the natural gas forecast. The planning areas used for this forecast are shown in **Table 8**.

Table 8: Utilities and Climate Zones within Forecasting Areas

Planning Area	Utilities Included	
	Electric Areas	
Pacific Gas and Electric (PG&E)- (Zones 1-5)	PG&E Alameda Biggs Calaveras Gridley Healdsburg Lassen MUD Lodi Lompoc Merced Modesto Palo Alto	Plumas – Sierra Port of Stockton Power and Water Resources Agency Redding Roseville San Francisco Shasta Silicon Valley Tuolumne Turlock Irrigation District Ukiah USBR-CVP
Sacramento Municipal Utility District (SMUD) (Zone 6)	SMUD	
Southern California Edison (SCE) (Zones 7-10)	Anaheim Anza Azusa Banning Bear Valley Colton MWD	Rancho Cucamonga Riverside Southern California Edison Southern California Water USBR-Parker Davis Valley Electric Vernon Victorville
Los Angeles Department of Water and Power (LADWP) (Zones 11-12)	LADWP	
San Diego Gas and Electric (SDG&E) (Zone 13)	SDG&E	
Cities of Burbank and Glendale (Zone 14)	Burbank Glendale	
Pasadena (Zone 16)	Pasadena	
Imperial Planning Area (Zone 15)	Imperial Irrigation District (IID)	
Other Planning Area	Pacificorp Sierra Pacific Surprise Valley	Truckee-Donner
Department of Water Resources (DWR)	DWR	
	Natural Gas Distribution Areas	
PG&E	PG&E Electric Planning Area SMUD	
SDG&E	SDG&E	
Southern California Gas Company (SCG)	SCG Long Beach	
OTHER	Avista Energy Southwest Gas Corporation	

Source: California Energy Commission, 2007.

Form 1.1 - Statewide
California Energy Demand 2008-2018 Staff Revised Forecast
Electricity Consumption by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1980	52,082	47,600	40,673	4,099	13,710	7,988	1,682	167,833
1981	53,494	50,419	41,270	4,382	16,363	8,292	1,639	175,861
1982	52,573	50,297	37,726	6,056	14,479	8,771	1,708	171,610
1983	54,577	52,023	38,580	6,309	11,590	9,139	1,608	173,826
1984	57,564	55,092	40,341	6,961	15,300	9,771	1,539	186,569
1985	58,528	56,907	41,434	7,314	17,455	10,448	1,539	193,626
1986	58,452	59,306	42,165	6,501	15,945	10,134	1,512	194,014
1987	61,267	62,949	44,139	6,457	16,425	11,139	1,537	203,913
1988	64,033	65,958	46,339	6,528	18,020	11,602	1,495	213,975
1989	65,316	68,932	46,872	6,715	19,297	12,287	1,508	220,927
1990	67,667	72,752	47,387	7,277	20,774	12,430	1,580	229,868
1991	67,142	72,540	46,007	7,269	16,266	12,640	1,614	223,478
1992	69,225	76,018	45,931	6,972	15,471	12,967	1,652	228,237
1993	68,424	76,604	45,535	6,687	15,902	13,059	1,648	227,859
1994	69,774	76,687	45,392	6,264	16,948	12,842	1,649	229,555
1995	69,770	78,409	46,837	6,481	14,301	13,238	1,624	230,660
1996	72,164	80,709	47,208	6,620	16,874	13,293	1,660	238,527
1997	73,547	84,442	48,848	6,565	17,514	13,914	1,701	246,532
1998	75,387	86,330	47,298	6,232	13,485	13,608	1,758	244,098
1999	76,482	89,466	48,698	5,863	17,097	13,921	1,658	253,186
2000	80,612	95,106	49,934	6,323	17,530	14,535	1,729	265,769
2001	75,915	90,183	44,780	5,722	18,920	13,132	1,727	250,380
2002	77,731	92,676	45,416	5,653	21,056	13,272	1,715	257,519
2003	82,196	97,085	43,351	5,887	20,273	13,236	1,751	263,780
2004	84,794	99,362	44,062	6,626	21,976	13,398	1,775	271,994
2005	86,069	99,992	44,463	6,746	19,267	14,129	1,784	272,449
2006	90,356	103,212	44,038	6,746	20,488	14,576	1,783	281,200
2007	92,015	105,357	44,167	6,793	20,318	14,748	1,799	285,197
2008	93,601	107,000	44,568	6,737	20,349	14,907	1,814	288,976
2009	95,402	108,835	44,698	6,801	20,387	15,068	1,830	293,021
2010	97,203	110,591	44,869	6,893	20,429	15,231	1,847	297,062
2011	99,092	112,289	45,130	6,969	20,482	15,404	1,864	301,230
2012	100,978	113,971	45,322	7,038	20,533	15,579	1,882	305,303
2013	102,800	115,596	45,409	7,102	20,584	15,758	1,900	309,148
2014	104,618	117,179	45,434	7,171	20,618	15,938	1,918	312,878
2015	106,468	118,697	45,449	7,239	20,663	16,122	1,936	316,575
2016	108,309	120,155	45,438	7,307	20,706	16,309	1,955	320,178
2017	110,140	121,576	45,332	7,367	20,744	16,498	1,974	323,630
2018	112,001	123,023	45,173	7,424	20,781	16,690	1,993	327,085

Last historic year is 2006. Consumption includes self-generation.

Annual Growth Rates (%)

1980-1990	2.7	4.3	1.5	5.9	4.2	4.5	-0.6	3.2
1990-2000	1.8	2.7	0.5	-1.4	-1.7	1.6	0.9	1.5
2000-2005	1.3	1.0	-2.3	1.3	1.9	-0.6	0.6	0.5
2005-2008	2.8	2.3	0.1	0.0	1.8	1.8	0.6	2.0
2008-2018	1.8	1.4	0.1	1.0	0.2	1.1	0.9	1.2
2005-2018	2.0	1.6	0.1	0.7	0.6	1.3	0.9	1.4

**Form 1.1b - Statewide
California Energy Demand 2008-2018 Staff Revised Forecast
Electricity Sales by Sector (GWh)**

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1980	52,082	47,574	39,823	4,104	13,737	7,956	1,685	166,961
1981	53,494	50,394	40,383	4,387	16,402	8,258	1,643	174,961
1982	52,573	50,255	36,658	6,015	14,507	8,657	1,705	170,370
1983	54,577	51,872	36,788	6,215	11,606	9,019	1,603	171,681
1984	57,564	54,889	38,471	6,739	15,317	9,601	1,535	184,114
1985	58,527	56,596	39,386	7,032	17,446	10,176	1,537	190,701
1986	58,449	58,924	39,576	5,927	15,931	9,730	1,512	190,048
1987	61,263	62,376	40,389	5,633	16,398	10,605	1,536	198,200
1988	64,028	65,076	40,850	5,570	17,978	10,943	1,494	205,940
1989	65,310	67,994	41,025	5,422	19,207	11,530	1,507	211,995
1990	67,013	71,307	41,270	5,837	21,256	11,776	1,576	220,035
1991	67,105	71,432	40,088	5,746	20,065	12,028	1,614	218,078
1992	69,218	74,878	40,068	5,441	15,747	12,379	1,651	219,382
1993	68,383	75,397	38,684	5,243	15,633	12,392	1,649	217,382
1994	69,755	75,235	38,304	4,846	16,373	12,173	1,649	218,336
1995	69,764	76,934	39,683	5,049	15,649	12,530	1,623	221,232
1996	72,069	79,321	39,460	5,156	15,263	12,725	1,662	225,655
1997	73,609	82,956	41,025	5,033	17,152	13,339	1,702	234,815
1998	75,391	84,791	39,717	4,678	15,582	13,095	1,758	235,012
1999	76,442	87,933	41,001	4,386	14,994	13,430	1,658	239,843
2000	80,648	93,608	42,594	4,854	17,535	14,040	1,729	255,008
2001	75,906	89,416	37,979	3,708	18,028	12,608	1,724	239,368
2002	77,703	91,507	37,357	3,395	19,165	12,736	1,714	243,577
2003	82,195	96,013	34,907	3,500	19,641	12,745	1,752	250,754
2004	84,771	98,246	36,725	4,210	21,214	12,920	1,775	259,860
2005	86,063	98,863	37,220	4,409	20,628	13,636	1,784	262,603
2006	90,337	101,963	36,838	4,636	19,693	14,020	1,783	269,271
2007	91,993	104,029	36,907	4,661	20,528	14,187	1,799	274,102
2008	93,565	105,585	37,245	4,582	20,348	14,340	1,814	277,479
2009	95,353	107,332	37,312	4,624	20,386	14,495	1,830	281,333
2010	97,139	109,001	37,420	4,694	20,429	14,652	1,847	285,182
2011	99,016	110,612	37,619	4,748	20,481	14,818	1,864	289,158
2012	100,888	112,207	37,748	4,794	20,532	14,988	1,882	293,039
2013	102,696	113,745	37,772	4,837	20,583	15,160	1,900	296,692
2014	104,501	115,241	37,735	4,884	20,618	15,335	1,918	300,231
2015	106,338	116,673	37,686	4,929	20,662	15,512	1,936	303,736
2016	108,164	118,043	37,612	4,974	20,705	15,693	1,955	307,147
2017	109,982	119,377	37,444	5,012	20,743	15,876	1,974	310,408
2018	111,829	120,737	37,222	5,047	20,781	16,062	1,993	313,671

Last Historic Year = 2006; Sales excludes self-generation

Annual Growth Rates (%)

1980-1990	2.6	4.1	0.4	3.6	4.5	4.0	-0.7	2.8
1990-2000	1.9	2.8	0.3	-1.8	-1.9	1.8	0.9	1.5
2000-2005	1.3	1.1	-2.7	-1.9	3.3	-0.6	0.6	0.6
2005-2008	2.8	2.2	0.0	1.3	-0.5	1.7	0.6	1.9
2008-2018	1.8	1.4	0.0	1.0	0.2	1.1	0.9	1.2
2005-2018	2.0	1.5	0.0	1.0	0.1	1.3	0.9	1.4

**Form 1.1c - Statewide
California Energy Demand 2008-2018 Staff Revised Forecast
Retail Sales by LSE (GWh)**

Planning Area	Agency	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
PG&E	Alameda	431.9	439.1	442.8	447.6	452.2	456.7	461.1	465.2	469.1	472.8	476.4	479.8	483.2
	Biggs	16.4	16.8	17.1	17.5	17.8	18.2	18.6	18.9	19.3	19.7	20.1	20.4	20.8
	Calaveras Public Power Agency	31.3	31.5	31.6	31.9	32.2	32.5	32.8	33.0	33.3	33.5	33.7	34.0	34.1
	Central Valley Project	2,195.7	2,195.7	2,195.7	2,195.7	2,195.7	2,195.7	2,195.7	2,195.7	2,195.7	2,195.7	2,195.7	2,195.7	2,195.7
	Gridley	31.9	32.7	33.3	34.0	34.6	35.3	36.0	36.7	37.4	38.1	38.8	39.5	40.2
	Healdsburg	73.5	75.0	75.9	77.0	78.1	79.2	80.4	81.5	82.5	83.6	84.6	85.6	86.6
	Lassen Municipal Utility District	129.3	130.0	131.4	133.2	134.9	136.8	138.6	140.4	142.1	143.8	145.5	147.2	148.8
	Lodi	460.5	472.7	483.2	495.2	507.0	519.5	532.2	544.6	556.9	569.3	581.6	593.8	605.8
	Lompoc	136.5	139.3	141.1	143.1	145.2	147.4	149.6	151.7	153.7	155.7	157.7	159.6	161.4
	Merced Irrigation District	373.8	381.7	387.5	392.5	397.2	402.8	408.2	413.0	417.5	421.9	426.1	430.1	433.7
	Modesto Irrigation District	2,562.0	2,624.4	2,668.2	2,710.3	2,751.6	2,798.0	2,843.8	2,887.5	2,930.1	2,973.2	3,015.8	3,057.7	3,099.3
	Palo Alto	968.3	989.6	1,001.1	1,007.5	1,013.6	1,020.3	1,026.3	1,031.4	1,036.1	1,040.2	1,043.9	1,046.8	1,049.1
	PG&E Bundled	76,963.1	78,860.4	79,981.0	81,148.8	82,303.2	83,557.8	84,787.7	85,958.6	87,086.4	88,220.3	89,339.1	90,416.9	91,483.2
	PG&E Direct Access	7,245.0	6,882.8	6,813.9	6,813.9	6,813.9	6,813.9	6,813.9	6,813.9	6,813.9	6,813.9	6,813.9	6,813.9	6,813.9
	Plumas-Sierra Rural Electric Cooperation	153.3	154.4	155.8	157.8	159.7	161.7	163.7	165.6	167.5	169.3	171.1	172.8	174.5
	Port of Stockton	2.2	2.2	2.3	2.3	2.4	2.4	2.5	2.5	2.6	2.6	2.7	2.7	2.8
	Power and Water Resource Purchasing Agency	273.8	275.0	275.6	276.6	277.9	279.3	280.4	282.1	283.0	284.4	285.8	286.9	288.0
	Redding	815.0	836.2	851.7	873.9	905.4	940.4	959.2	977.8	996.6	1,015.7	1,035.0	1,054.5	1,074.3
	Roseville	1,222.2	1,257.9	1,288.4	1,323.8	1,358.6	1,395.2	1,432.4	1,469.0	1,505.6	1,542.5	1,579.4	1,615.7	1,652.1
	San Francisco	1,268.2	1,255.7	1,261.5	1,268.3	1,274.6	1,280.5	1,286.1	1,291.6	1,296.7	1,301.3	1,305.6	1,309.4	1,313.2
	Shasta Dam Area Public Utility District	184.8	188.3	190.9	192.3	193.6	195.5	197.1	198.4	199.4	200.4	201.2	201.8	202.2
	Silicon Valley Power	2,619.3	2,664.2	2,698.5	2,729.6	2,760.9	2,795.3	2,827.7	2,856.8	2,883.9	2,910.9	2,937.2	2,961.0	2,982.9
	Tuolumne County Public Power Agency	26.2	26.4	26.6	26.9	27.1	27.4	27.7	27.9	28.1	28.3	28.5	28.7	28.8
	Turlock Irrigation District	1,891.3	1,928.3	1,957.6	1,986.8	2,015.9	2,048.3	2,080.3	2,111.6	2,141.9	2,173.0	2,204.0	2,234.6	2,265.3
	Ukiah	88.0	88.6	89.3	90.4	91.5	92.6	93.7	94.6	95.6	96.5	97.4	98.3	99.1
PG&E Total		100,163.6	101,948.9	103,202.0	104,576.9	105,944.6	107,433.0	108,875.6	110,250.2	111,574.8	112,906.7	114,220.8	115,487.2	116,739.2
SMUD	SMUD	10,829.3	11,033.4	11,172.3	11,337.6	11,502.1	11,683.3	11,868.8	12,045.2	12,219.1	12,387.1	12,544.3	12,692.4	12,838.1
SCE	Anaheim	2,689.9	2,717.6	2,748.7	2,778.6	2,810.4	2,842.3	2,873.0	2,900.6	2,926.1	2,950.2	2,972.9	2,993.3	3,015.8
	Anza Electric Cooperative, Inc.	45.9	47.3	48.9	50.5	52.1	53.7	55.3	56.9	58.6	60.2	61.8	63.4	65.0
	Azusa	255.7	258.2	261.3	264.1	267.0	270.2	273.0	275.5	277.9	280.2	282.4	284.4	286.3
	Banning	145.8	149.8	154.4	159.1	163.8	168.3	172.9	177.3	181.7	186.1	190.4	194.5	198.7
	Bear Valley Electric Service	145.0	147.5	150.2	153.0	155.6	157.9	160.2	162.3	164.4	166.4	168.2	169.9	171.6
	Boulder City/Parker Davis	110.6	113.3	116.0	118.9	121.8	124.4	127.2	129.9	132.8	135.7	138.7	141.7	144.8
	Colton	342.3	352.4	363.8	375.2	386.3	397.1	407.7	418.0	428.2	438.3	448.1	457.7	467.3
	Metropolitan Water Department	1,232.9	1,232.8	1,233.5	1,233.9	1,234.3	1,235.2	1,237.0	1,237.3	1,237.5	1,237.7	1,237.9	1,237.9	1,238.0
	Rancho Cucamonga	60.3	62.5	64.6	66.8	68.9	70.9	72.8	74.7	76.6	78.4	80.2	82.0	83.8
	Riverside	2,037.8	2,100.5	2,170.0	2,241.1	2,310.0	2,376.4	2,442.7	2,507.2	2,571.4	2,635.3	2,697.4	2,758.5	2,820.0
	SCE Bundled	79,307.8	80,756.5	82,365.6	83,902.7	85,478.8	87,055.9	88,601.3	90,034.5	91,426.3	92,791.9	94,108.3	95,357.5	96,624.9
	SCE Direct access	9,600.0	9,500.0	9,405.0	9,405.0	9,405.0	9,405.0	9,405.0	9,405.0	9,405.0	9,405.0	9,405.0	9,405.0	9,405.0
	Valley Electric Association, Inc.	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
	Vernon	1,150.0	1,153.4	1,163.6	1,169.2	1,177.5	1,187.4	1,196.0	1,202.6	1,208.1	1,213.2	1,217.8	1,220.3	1,222.2
	Victorville Municipal	25.3	25.8	26.4	26.9	27.5	28.0	28.6	29.0	29.4	29.8	30.2	30.5	30.7
SCE Total		97,155.8	98,624.2	100,278.6	101,951.8	103,665.7	105,379.4	107,059.3	108,617.5	110,130.5	111,615.1	113,045.7	114,403.1	115,780.6
LADWP	LADWP	24,313.5	24,511.0	24,673.0	24,863.4	25,021.7	25,163.1	25,294.5	25,413.1	25,521.9	25,619.2	25,715.4	25,800.0	25,886.6
BUGL	Burbank	1,093.5	1,096.3	1,098.6	1,102.1	1,106.9	1,112.1	1,115.3	1,119.0	1,121.1	1,123.9	1,125.1	1,127.2	1,127.9
	Glendale	1,141.8	1,144.6	1,146.1	1,149.7	1,154.7	1,159.9	1,163.1	1,166.8	1,169.0	1,171.9	1,173.1	1,175.2	1,176.0
BUGL Total		2,235.3	2,240.9	2,244.6	2,251.8	2,261.7	2,272.0	2,278.4	2,285.8	2,290.0	2,295.8	2,298.2	2,302.4	2,303.9
PASD	Pasadena	1,242.7	1,247.2	1,253.3	1,258.8	1,263.1	1,270.7	1,276.4	1,281.0	1,285.6	1,291.0	1,293.4	1,296.8	1,300.5
SDG&E	SDG&E Bundled	16,996.9	17,180.7	17,448.2	17,777.3	18,101.5	18,429.8	18,752.9	19,060.5	19,363.2	19,666.8	19,967.1	20,255.2	20,539.8
	SDG&E Direct Access	3,143.9	3,112.5	3,112.5	3,112.5	3,112.5	3,112.5	3,112.5	3,112.5	3,112.5	3,112.5	3,112.5	3,112.5	3,112.5
SDG&E Total		20,140.8	20,293.2	20,560.7	20,889.8	21,214.0	21,542.2	21,865.4	22,173.0	22,475.7	22,779.3	23,079.6	23,367.7	23,652.3
IID	Imperial Irrigation District	3,158.2	3,315.8	3,412.7	3,516.2	3,618.6	3,718.9	3,820.9	3,921.9	4,023.3	4,127.3	4,230.5	4,333.6	4,438.7
OTHER	Mountain Utilities	6.8	7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2
	Needles	60.0	62.9	63.1	63.2	63.4	63.5	63.7	63.9	64.0	64.2	64.4	64.6	64.7
	Pacificorp	894.2	919.8	922.0	924.2	926.5	928.8	931.2	933.6	936.0	938.5	941.0	943.5	946.1
	Sierra Pacific Power Company	486.7	510.8	512.0	513.3	514.5	515.8	517.1	518.4	519.8	521.2	522.6	524.0	525.4
	Surprise Valley Electrical Corporation	77.5	81.2	81.3	81.5	81.7	82.0	82.2	82.4	82.6	82.8	83.0	83.2	83.5
	Trinity Public Utility District	81.7	84.6	84.8	85.0	85.2	85.4	85.6	85.9	86.1	86.3	86.5	86.8	87.0
	Truckee-Donner Public Utility District	141.3	146.2	146.6	146.9	147.3	147.7	148.0	148.4	148.8	149.2	149.6	150.0	150.4
OTHER Total		1,748.1	1,812.4	1,816.8	1,821.2	1,825.7	1,830.3	1,834.9	1,839.6	1,844.4	1,849.3	1,854.2	1,859.2	1,864.3
DWR	Department of Water Resources	8,283.3	9,075.4	8,865.1	8,865.1	8,865.1	8,865.1	8,865.1	8,865.1	8,865.1	8,865.1	8,865.1	8,865.1	8,865.1
Statewide Total		269,271	274,102	277,479	281,333	285,182	289,158	293,039	296,692	300,231	303,736	307,147	310,408	313,671
Statewide Total excluding DWR, WAPA, and MWD		257,559	261,598	265,185	269,038	272,887	276,862	280,742	284,394	287,932	291,437	294,849	298,109	301,373

Last Historic Year = 2006; Sales excludes self-generation

**Form 1.2 - Statewide
California Energy Demand 2008-2018 Staff Revised Forecast
Net Energy for Load (GWh)**

Year	Total Consumption	Net Losses	Gross Generation	Non-PV Self Generation	Incremental PV	Total Private Supply	Net Energy for Load
1990	228,473	18,582	247,055	9,132	8,482	9,132	237,923
1991	222,098	18,205	240,302	9,186	4,567	9,186	231,116
1992	226,819	18,633	245,452	9,128	4,243	9,128	236,323
1993	226,403	18,481	244,884	10,156	4,538	10,156	234,728
1994	228,083	18,473	246,556	10,629	5,133	10,629	235,927
1995	229,158	18,651	247,809	10,781	3,698	10,781	237,028
1996	236,943	19,180	256,123	11,206	5,342	11,206	244,917
1997	244,994	19,830	264,824	11,406	5,713	11,406	253,418
1998	242,561	19,714	262,275	11,170	3,551	11,170	251,105
1999	251,576	20,373	271,949	11,201	5,699	11,201	260,748
2000	264,222	21,419	285,640	10,823	5,699	10,823	274,817
2001	248,733	20,227	268,959	10,053	6,619	18,604	258,907
2002	255,702	20,599	276,301	11,941	8,528	20,143	264,360
2003	262,094	21,086	283,180	12,473	9,241	12,473	270,707
2004	270,251	21,847	292,098	11,288	10,064	11,288	280,811
2005	270,701	21,910	292,610	11,212	8,635	11,212	281,398
2006	279,431	22,638	302,068	11,116	9,460	11,116	290,952
2007	283,384	22,979	306,363	11,215	9,331	11,305	295,059
2008	287,159	23,282	310,441	11,316	9,422	11,497	298,945
2009	291,200	23,609	314,809	11,418	9,512	11,688	303,121
2010	295,237	23,934	319,171	11,520	9,602	11,880	307,291
2011	299,400	24,269	323,669	11,621	9,692	12,072	311,597
2012	303,468	24,596	328,064	11,723	9,782	12,264	315,800
2013	307,308	24,904	332,212	11,824	9,872	12,455	319,757
2014	311,033	25,203	336,236	11,926	9,962	12,647	323,589
2015	314,725	25,499	340,224	12,028	10,052	12,839	327,386
2016	318,324	25,788	344,112	12,129	10,143	13,031	331,081
2017	321,771	26,065	347,835	12,231	10,233	13,222	334,613
2018	325,221	26,341	351,563	12,333	10,323	13,414	338,148

Annual Growth Rates (%)

1980-1990	3.2	2.7	3.2		9.3		2.8
1990-2000	1.5	1.4	1.5	1.7	-3.9	1.7	1.5
2000-2005	0.5	0.5	0.5	0.7	8.7	0.7	0.5
2005-2008	2.0	2.0	2.0	0.3	2.9	0.8	2.0
2008-2018	1.3	1.2	1.3	0.9	0.9	1.6	1.2
2005-2018	1.4	1.4	1.4	0.7	1.4	1.4	1.4

**Form 1.3 - Statewide
California Energy Demand 2008-2018 Staff Revised Forecast
Coincident Peak Demand by Sector (MW)**

Year	Residential	Commercial	Industrial	Agricultural	Other	Total Demand
1980	12,290	9,971	6,439	1,920	1,482	31,802
1981	12,155	11,128	6,665	1,988	1,660	33,126
1982	10,983	10,488	6,434	1,623	1,798	30,863
1983	12,115	11,249	6,771	1,410	1,638	32,960
1984	13,323	12,536	7,289	1,884	1,815	36,548
1985	13,625	12,098	6,949	2,118	2,067	36,375
1986	12,800	12,216	7,132	1,841	1,976	35,516
1987	13,161	12,470	7,222	1,900	2,052	36,383
1988	15,350	13,825	7,408	2,076	2,240	40,370
1989	14,367	14,114	7,337	1,787	2,381	39,325
1990	16,318	15,999	7,837	2,090	2,443	43,959
1991	15,391	15,483	7,604	2,107	2,315	42,507
1992	16,559	16,348	7,720	2,002	2,281	44,546
1993	15,804	15,491	7,515	1,913	2,307	42,639
1994	17,258	16,146	7,487	2,078	2,349	44,876
1995	17,646	16,280	7,655	1,773	2,210	45,245
1996	18,359	17,090	7,850	1,966	2,427	47,233
1997	19,686	17,837	7,848	1,966	2,489	49,335
1998	20,209	19,433	8,110	1,687	2,408	51,542
1999	19,717	18,854	7,663	1,926	2,577	50,248
2000	20,271	19,369	7,246	1,676	2,495	50,566
2001	18,777	17,560	6,672	2,021	2,367	46,831
2002	20,171	18,657	7,053	2,091	2,686	49,928
2003	20,730	20,529	6,964	1,637	2,775	51,844
2004	19,926	21,045	7,776	1,890	2,928	52,704
2005	22,918	20,957	7,204	1,833	2,804	54,978
2006	25,461	22,213	7,948	2,031	3,093	59,937
2007	24,926	21,571	7,536	1,912	2,992	58,146
2008	25,394	21,871	7,585	1,915	3,016	58,990
2009	25,896	22,196	7,614	1,920	3,040	59,875
2010	26,405	22,505	7,652	1,926	3,064	60,762
2011	26,934	22,804	7,701	1,934	3,090	61,673
2012	27,472	23,102	7,738	1,942	3,116	62,579
2013	28,007	23,391	7,759	1,950	3,143	63,459
2014	28,551	23,674	7,772	1,953	3,170	64,328
2015	29,103	23,947	7,782	1,959	3,197	65,198
2016	29,653	24,210	7,789	1,965	3,225	66,052
2017	30,207	24,468	7,781	1,969	3,253	66,888
2018	30,772	24,732	7,764	1,974	3,282	67,732

Annual Growth Rates (%)

1980-1990	2.9	4.8	2.0	0.9	5.1	3.3
1990-2000	2.2	1.9	-0.8	-2.2	0.2	1.4
2000-2005	2.5	1.6	-0.1	1.8	2.4	1.7
2005-2008	3.5	1.4	1.7	1.5	2.5	2.4
2008-2018	1.9	1.2	0.2	0.3	0.8	1.4
2005-2018	2.3	1.3	0.6	0.6	1.2	1.6

**Form 1.4 - Statewide
California Energy Demand 2008-2018 Staff Revised Forecast
Peak Demand (MW)**

Year	Total End Use Load	Net Losses	Gross Generation	Non-PV Self Generation	New PV Installations	Total Private Supply
1980	32,101	2,873	34,974	157	0	157
1981	33,596	2,998	36,594	161	0	161
1982	31,326	2,789	34,115	214	0	214
1983	33,183	2,950	36,133	362	0	362
1984	36,847	3,269	40,115	418	0	418
1985	36,857	3,264	40,121	486	0	486
1986	35,964	3,163	39,128	650	0	650
1987	36,805	3,217	40,022	919	0	919
1988	40,899	3,548	44,447	1,297	0	1,297
1989	39,986	3,445	43,431	1,423	0	1,423
1990	44,688	3,835	48,523	1,488	0	1,488
1991	42,899	3,680	46,579	1,499	0	1,499
1992	44,910	3,843	48,753	1,490	0	1,490
1993	43,029	3,677	46,706	1,654	0	1,654
1994	45,317	3,858	49,175	1,733	0	1,733
1995	45,563	3,893	49,456	1,759	0	1,759
1996	47,692	4,074	51,766	1,825	0	1,825
1997	49,826	4,264	54,089	1,858	0	1,858
1998	51,847	4,450	56,298	1,822	0	1,822
1999	50,738	4,349	55,087	1,828	0	1,828
2000	51,056	4,380	55,436	1,767	0	1,767
2001	47,397	4,063	51,460	1,641	0	1,641
2002	50,658	4,328	54,986	1,953	0	1,953
2003	52,634	4,480	57,115	2,039	0	2,039
2004	53,565	4,573	58,138	1,844	0	1,844
2005	55,717	4,761	60,478	1,832	0	1,832
2006	60,747	5,214	65,960	1,841	0	1,841
2007	58,937	5,044	63,980	1,858	37	1,895
2008	59,780	5,115	64,895	1,875	74	1,949
2009	60,666	5,190	65,856	1,892	111	2,004
2010	61,553	5,265	66,818	1,910	148	2,058
2011	62,464	5,343	67,806	1,927	185	2,112
2012	63,370	5,420	68,790	1,944	222	2,166
2013	64,250	5,495	69,745	1,961	259	2,220
2014	65,119	5,569	70,688	1,978	296	2,275
2015	65,989	5,642	71,631	1,996	333	2,329
2016	66,842	5,715	72,558	2,013	370	2,383
2017	67,678	5,786	73,464	2,030	407	2,437
2018	68,523	5,858	74,380	2,047	445	2,492

2006=Last historic year

Annual Growth Rates (%)

1980-1990	3.4	2.9	3.3	25.2		25.2
1990-2000	1.3	1.3	1.3	1.7		1.7
2000-2005	1.8	1.7	1.8	0.7		0.7
2005-2008	2.4	2.4	2.4	0.8		2.1
2008-2018	1.4	1.4	1.4	0.9	19.6	2.5
2005-2018	1.6	1.6	1.6	0.9		2.4

Form 1.5a
California Energy Demand 2008-2018 Staff Revised Forecast
Net Energy for Load by Control Area
(GWh)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Growth Rate 2008-2018
PG&E North	20,419	19,714	19,957	20,221	20,485	20,775	21,062	21,345	21,621	21,900	22,178	22,448	22,719	1.3%
PG&E Bundled Customers	17,223	16,636	16,905	17,143	17,380	17,642	17,902	18,158	18,407	18,661	18,913	19,159	19,405	1.4%
PG&E Direct Access	1,071	1,017	967	967	967	967	967	967	967	967	967	967	967	0.0%
PG&E San Francisco	906	873	885	897	909	922	935	948	961	973	986	999	1,011	1.3%
Northern California Power Agency	518	510	517	524	531	538	545	552	559	566	573	580	586	1.3%
Silicon Valley Power	485	474	480	486	491	498	504	509	515	520	525	530	534	1.1%
CCSF	124	118	118	119	120	120	121	121	122	122	122	123	123	0.4%
Other Publicly Owned Utilities	93	85	86	87	87	88	89	89	90	91	91	92	93	0.8%
Dept of Water Resources - North	145	141	141	141	141	141	141	141	141	141	141	141	141	0.0%
Total North of Path 15	20,564	19,855	20,099	20,362	20,626	20,916	21,204	21,486	21,762	22,041	22,319	22,589	22,860	
Path 26 Pacific Gas & Electric - South	1,365	1,318	1,339	1,358	1,377	1,397	1,418	1,438	1,458	1,478	1,498	1,517	1,537	1.4%
dwr Path 26 - Dept of Water Resources	239	233	233	233	233	233	233	233	233	233	233	233	233	0.0%
Total Zone Path 26	1,604	1,551	1,573	1,591	1,610	1,631	1,651	1,672	1,691	1,711	1,731	1,751	1,770	1.2%
Total NP15	22,168	21,406	21,671	21,954	22,236	22,547	22,855	23,158	23,453	23,752	24,050	24,340	24,630	1.3%
Turlock Irrigation District Control Area	587	554	563	572	581	591	601	611	621	631	641	651	661	1.6%
Sacramento Municipal Utilities District	3,286	3,136	3,174	3,216	3,261	3,311	3,363	3,415	3,465	3,515	3,559	3,603	3,645	1.4%
WAPA	240	220	220	220	219	219	219	218	218	218	218	218	217	-0.1%
Redding	260	248	252	258	265	273	279	285	290	296	302	308	314	2.2%
Roseville	338	330	338	346	355	364	374	383	392	402	411	421	431	2.5%
Shasta	36	33	34	34	34	35	35	35	36	36	36	36	37	0.8%
Modesto Irrigation District	738	698	710	722	734	747	760	773	786	799	813	826	839	1.7%
Total SMUD/WAPA Control Area	4,897	4,665	4,727	4,797	4,868	4,949	5,030	5,110	5,188	5,267	5,339	5,412	5,483	1.5%
Southern California Edison Planning Area Total	23,460	22,876	23,272	23,674	24,082	24,480	24,877	25,258	25,637	26,013	26,382	26,742	27,112	1.5%
SCE Service Area Total	21,647	21,109	21,476	21,849	22,227	22,597	22,966	23,321	23,672	24,022	24,365	24,701	25,045	1.5%
Anaheim Public Utilities Dept.	578	566	572	578	584	591	597	602	607	612	617	621	625	0.9%
Riverside Utilities Dept	584	572	587	603	619	634	649	664	679	694	709	724	739	2.3%
Vernon Municipal Light Dept	187	180	182	182	184	185	187	188	189	190	190	191	191	0.5%
Metropolitan Water District	192	184	185	185	185	185	186	185	185	186	186	186	186	0.1%
Other Publicly Owned Utilities	271	264	270	276	282	288	293	299	304	310	315	321	326	1.9%
Pasadena Water and Power Dept	316	299	300	300	300	302	303	303	304	305	305	306	306	0.2%
San Diego Gas & Electric	4,419	4,506	4,568	4,641	4,712	4,784	4,856	4,925	4,994	5,063	5,131	5,198	5,263	1.4%
SDG&E Bundled Customers	3,576	3,657	3,712	3,774	3,835	3,895	3,956	4,014	4,072	4,131	4,189	4,245	4,300	1.5%
SDG&E Direct Access	844	848	857	867	877	889	900	911	921	932	942	953	963	1.2%
Dept of Water Resources - South	474	463	463	463	463	463	463	463	463	463	463	463	463	0.0%
Total South of Path 15	28,669	28,144	28,604	29,079	29,557	30,029	30,498	30,949	31,398	31,844	32,281	32,709	33,145	1.5%
Los Angeles Department of Water and Power	6,163	5,685	5,717	5,754	5,786	5,813	5,840	5,863	5,886	5,907	5,928	5,946	5,966	0.4%
Burbank Public Service Dept	312	292	292	292	293	294	295	295	294	297	297	298	298	0.2%
Glendale Public Service Dept	330	309	308	309	309	310	310	311	312	311	311	311	311	0.1%
Total LADWP Control Area	6,805	6,285	6,317	6,355	6,388	6,417	6,444	6,469	6,493	6,515	6,536	6,555	6,575	0.4%
Imperial Irrigation District Control Area	992	1,032	1,063	1,097	1,129	1,162	1,195	1,227	1,260	1,294	1,327	1,361	1,395	2.8%
Total CAISO	50,837	49,550	50,275	51,032	51,794	52,576	53,353	54,107	54,851	55,597	56,331	57,049	57,775	1.4%
Total State	64,119	62,085	62,946	63,852	64,760	65,695	66,623	67,524	68,413	69,302	70,174	71,027	71,889	1.3%
Coincident Demand														
Total CAISO Coincident Demand	49,620	48,363	49,071	49,810	50,553	51,317	52,076	52,811	53,537	54,265	54,982	55,683	56,392	1.4%
Total Statewide Coincident Demand	62,583	60,599	61,439	62,323	63,209	64,121	65,028	65,907	66,775	67,643	68,494	69,326	70,167	1.3%

Form 1.5b
California Energy Demand 2008-2018 Staff Revised Forecast
1-in-2 Electric Peak Demand by Control Area and Climate Zone (MW)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average Annual Growth Rate 2008-2018
PG&E North	20,419	19,662	19,911	20,175	20,439	20,729	21,017	21,299	21,575	21,854	22,132	22,404	22,675	1.3%
PG&E Service Area by CEC Forecasting Climate zone:														
Zone 1 (North Coast and Mountain)	847	774	782	794	805	817	830	841	853	864	876	887	898	1.4%
Zone 2 (Sacramento Region)	2,211	2,141	2,187	2,244	2,298	2,357	2,420	2,480	2,542	2,605	2,668	2,732	2,798	2.5%
Zone 3 (Valley Region)	6,833	6,418	6,513	6,590	6,671	6,758	6,846	6,934	7,019	7,107	7,194	7,282	7,368	1.2%
Zone 4 (East Bay Region)	5,599	5,619	5,682	5,757	5,834	5,920	6,003	6,087	6,168	6,248	6,330	6,406	6,484	1.3%
Zone 5 (San Francisco Region)	3,710	3,523	3,546	3,574	3,603	3,632	3,659	3,684	3,707	3,731	3,752	3,772	3,791	0.7%
PG&E Service Area Total	19,200	18,475	18,711	18,960	19,210	19,485	19,758	20,027	20,289	20,555	20,820	21,079	21,338	1.3%
Northern California Power Agency	518	510	517	524	531	538	545	552	559	566	573	580	586	1.3%
Silicon Valley Power	485	474	480	486	491	498	504	509	515	520	525	530	534	1.1%
CCSF	124	118	118	119	120	120	121	121	122	122	122	123	123	0.4%
Other Publicly Owned Utilities	93	85	86	87	87	88	89	89	90	91	91	92	93	0.8%
Dept of Water Resources - North	145	141	141	141	141	141	141	141	141	141	141	141	141	0.0%
Total North of Path 15	20,564	19,803	20,053	20,317	20,581	20,870	21,158	21,440	21,716	21,996	22,274	22,545	22,816	1.3%
Path 26 Pacific Gas & Electric - South	1,365	1,370	1,385	1,404	1,422	1,443	1,464	1,484	1,504	1,523	1,543	1,562	1,581	1.3%
Path 26 - Dept of Water Resources	239	233	233	233	233	233	233	233	233	233	233	233	233	0.0%
Total Zone Path 26	1,604	1,603	1,619	1,637	1,656	1,677	1,697	1,717	1,737	1,757	1,777	1,795	1,814	1.1%
Total NP15	22,168	21,406	21,671	21,954	22,236	22,547	22,855	23,158	23,453	23,752	24,050	24,340	24,630	1.3%
Turlock Irrigation District Control Area	587	554	563	572	581	591	601	611	621	631	641	651	661	1.6%
Sacramento Municipal Utilities District	3,286	3,136	3,174	3,216	3,261	3,311	3,363	3,415	3,465	3,515	3,559	3,603	3,645	1.4%
WAPA	240	220	220	220	219	219	219	219	218	218	218	218	217	-0.1%
Redding	260	248	252	258	265	273	279	285	290	296	302	308	314	2.2%
Roseville	338	330	338	346	355	364	374	383	392	402	411	421	431	2.5%
Shasta	36	33	34	34	34	35	35	35	36	36	36	36	37	0.8%
Modesto Irrigation District	738	698	710	722	734	747	760	773	786	799	813	826	839	1.7%
Total SMUD/WAPA Control Area	4,897	4,665	4,727	4,797	4,868	4,949	5,030	5,110	5,188	5,267	5,339	5,412	5,483	1.5%
Southern California Edison Planning Area Total	23,460	22,876	23,272	23,674	24,082	24,480	24,877	25,258	25,637	26,013	26,382	26,742	27,112	1.5%
SCE Service Area by CEC Forecasting Climate zone:														
Zone 7 (Southern San Joaquin Valley)	1,258	1,239	1,264	1,292	1,318	1,347	1,375	1,404	1,430	1,458	1,486	1,515	1,545	2.0%
Zone 8 (Coastal LA Basin)	8,867	8,687	8,787	8,888	8,992	9,096	9,198	9,289	9,377	9,464	9,542	9,616	9,695	1.0%
Zone 9 (Inland LA Basin)	4,055	3,903	3,960	4,018	4,076	4,138	4,194	4,250	4,304	4,358	4,410	4,463	4,509	1.3%
Zone 10 (Inland Empire)	7,467	7,280	7,464	7,652	7,841	8,017	8,199	8,378	8,561	8,743	8,927	9,107	9,294	2.2%
SCE Service Area Total	21,647	21,109	21,476	21,849	22,227	22,597	22,966	23,321	23,672	24,022	24,365	24,701	25,045	1.5%
Anaheim Public Utilities Dept.	578	566	572	578	584	591	597	602	607	612	617	621	625	0.9%
Riverside Utilities Dept	584	572	587	603	619	634	649	664	679	694	709	724	739	2.3%
Vernon Municipal Light Dept	187	180	182	182	184	185	187	188	189	190	190	191	191	0.5%
Metropolitan Water District	192	184	185	185	185	185	186	185	185	186	186	186	186	0.1%
Other Publicly Owned Utilities	271	264	270	276	282	288	293	299	304	310	315	321	326	1.9%
Pasadena Water and Power Dept	316	299	300	300	300	302	303	303	304	305	305	306	306	0.2%
San Diego Gas & Electric	4,419	4,506	4,568	4,641	4,712	4,784	4,856	4,925	4,994	5,063	5,131	5,198	5,263	1.4%
SDG&E Bundled Customers	3,576	3,657	3,712	3,774	3,835	3,895	3,956	4,014	4,072	4,131	4,189	4,245	4,300	1.5%
SDG&E Direct Access	844	848	857	867	877	889	900	911	921	932	942	953	963	1.2%
Dept of Water Resources - South	474	463	463	463	463	463	463	463	463	463	463	463	463	0.0%
Total South of Path 15	28,669	28,144	28,604	29,079	29,557	30,029	30,498	30,949	31,398	31,844	32,281	32,709	33,145	1.5%
Los Angeles Department of Water and Power	6,163	5,685	5,717	5,754	5,786	5,813	5,840	5,863	5,886	5,907	5,928	5,946	5,966	0.4%
Burbank Public Service Dept	312	292	292	292	293	294	295	295	294	297	297	298	298	0.2%
Glendale Public Service Dept	330	309	308	309	309	310	310	311	312	311	311	311	311	0.1%
Total LADWP Control Area	6,805	6,285	6,317	6,355	6,388	6,417	6,444	6,469	6,493	6,515	6,536	6,555	6,575	0.4%
Imperial Irrigation District Control Area	992	1,032	1,063	1,097	1,129	1,162	1,195	1,227	1,260	1,294	1,327	1,361	1,395	2.8%
Total CAISO	50,837	49,550	50,275	51,032	51,794	52,576	53,353	54,107	54,851	55,597	56,331	57,049	57,775	1.4%
Total State	64,119	62,085	62,946	63,852	64,760	65,695	66,623	67,524	68,413	69,302	70,174	71,027	71,889	1.3%
Coincident Demand														
Total CAISO Coincident Demand	49,620	48,363	49,071	49,810	50,553	51,317	52,076	52,811	53,537	54,265	54,982	55,683	56,392	1.4%
Total Statewide Coincident Demand	62,583	60,599	61,439	62,323	63,209	64,121	65,028	65,907	66,775	67,643	68,494	69,326	70,167	1.3%

Form 1.5c
California Energy Demand 2008-2018 Staff Revised Forecast
1-in-5 Electric Peak Demand by Control Area
(MW)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
PG&E North	20,244	20,494	20,765	21,036	21,334	21,629	21,919	22,202	22,489	22,774	23,052	23,330
Dept of Water Resources - North	141	141	141	141	141	141	141	141	141	141	141	141
Total North of Path 15	20,385	20,636	20,906	21,177	21,475	21,770	22,060	22,343	22,630	22,916	23,193	23,471
Path 26 Pacific Gas & Electric - South	1,353	1,375	1,394	1,414	1,435	1,456	1,477	1,497	1,518	1,538	1,558	1,578
Path 26 - Dept of Water Resources	233	233	233	233	233	233	233	233	233	233	233	233
Total Zone Path 26	1,587	1,609	1,628	1,647	1,668	1,689	1,710	1,731	1,751	1,772	1,791	1,811
Total NP15	21,972	22,244	22,534	22,824	23,143	23,460	23,771	24,074	24,381	24,687	24,985	25,283
Turlock Irrigation District Control Area	569	578	587	597	607	617	627	638	648	658	668	679
Total SMUD/WAPA Control Area	4,940	5,006	5,079	5,155	5,241	5,326	5,411	5,494	5,577	5,654	5,730	5,806
Southern California Edison Planning Area Total	24,422	24,846	25,275	25,709	26,135	26,559	26,966	27,370	27,772	28,165	28,550	28,945
Pasadena Water and Power Dept	319	320	320	321	322	323	323	324	326	326	326	327
San Diego Gas & Electric	4,812	4,879	4,956	5,032	5,109	5,186	5,260	5,333	5,407	5,480	5,551	5,621
Dept of Water Resources - South	463	463	463	463	463	463	463	463	463	463	463	463
Total South of Path 15	30,017	30,508	31,015	31,526	32,029	32,531	33,012	33,491	33,968	34,434	34,891	35,356
Los Angeles Department of Water and Power	6,053	6,088	6,127	6,161	6,190	6,218	6,243	6,268	6,290	6,312	6,331	6,352
Burbank Public Service Dept	311	311	311	312	313	314	315	314	316	316	317	317
Glendale Public Service Dept	329	328	329	329	330	330	331	333	331	331	331	331
Total LADWP Control Area	6,692	6,727	6,767	6,802	6,833	6,862	6,889	6,914	6,937	6,960	6,979	7,001
Imperial Irrigation District Control Area	1,101	1,135	1,171	1,206	1,240	1,275	1,310	1,345	1,381	1,417	1,453	1,489
Total CAISO	51,989	52,752	53,549	54,350	55,173	55,990	56,783	57,565	58,349	59,121	59,876	60,639
Total State	65,291	66,198	67,153	68,109	69,093	70,071	71,019	71,955	72,891	73,809	74,707	75,614
Coincident Demand												
Total CAISO Coincident Demand	50,744	51,489	52,267	53,049	53,851	54,650	55,423	56,186	56,952	57,705	58,442	59,187
Total Statewide Coincident Demand	63,727	64,613	65,545	66,478	67,439	68,393	69,319	70,232	71,146	72,042	72,918	73,803

Form 1.5d
California Energy Demand 2008-2018 Staff Revised Forecast
1-in-10 Electric Peak Demand by Control Area
(MW)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
PG&E North	20,450	20,703	20,976	21,250	21,551	21,849	22,142	22,428	22,718	23,006	23,287	23,567
Dept of Water Resources - North	141	141	141	141	141	141	141	141	141	141	141	141
Total North of Path 15	20,591	20,844	21,118	21,391	21,692	21,990	22,283	22,569	22,859	23,147	23,428	23,709
Path 26 Pacific Gas & Electric - South	1,367	1,389	1,409	1,428	1,449	1,471	1,492	1,512	1,533	1,554	1,574	1,594
Path 26 - Dept of Water Resources	233	233	233	233	233	233	233	233	233	233	233	233
Total Zone Path 26	1,601	1,623	1,642	1,661	1,683	1,704	1,725	1,746	1,766	1,787	1,807	1,828
Total NP15	22,192	22,467	22,760	23,053	23,375	23,694	24,009	24,315	24,625	24,934	25,235	25,536
Turlock Irrigation District Control Area	574	584	593	603	613	624	634	644	654	665	675	686
Sacramento Municipal Utilities District	3,446	3,487	3,533	3,582	3,637	3,695	3,751	3,807	3,862	3,910	3,958	4,005
WAPA	241	241	241	241	241	241	241	240	240	240	239	239
Redding	272	277	284	292	300	306	313	319	325	332	338	345
Roseville	362	371	381	390	400	410	421	431	441	452	463	473
Shasta	36	37	37	38	38	39	39	39	39	40	40	40
Modesto Irrigation District	767	780	793	806	821	835	850	864	878	893	907	922
Total SMUD/WAPA Control Area	5,125	5,194	5,270	5,349	5,437	5,526	5,614	5,700	5,786	5,866	5,945	6,024
Southern California Edison Planning Area Total	24,679	25,107	25,540	25,979	26,409	26,838	27,249	27,657	28,063	28,461	28,850	29,249
Pasadena Water and Power Dept	323	323	324	324	326	326	327	328	329	329	330	330
San Diego Gas & Electric	4,904	4,972	5,051	5,128	5,206	5,285	5,360	5,435	5,510	5,584	5,657	5,728
Dept of Water Resources - South	463	463	463	463	463	463	463	463	463	463	463	463
Total South of Path 15	30,368	30,865	31,378	31,895	32,404	32,912	33,399	33,883	34,366	34,837	35,300	35,771
Los Angeles Department of Water and Power	6,216	6,251	6,292	6,326	6,356	6,385	6,411	6,436	6,458	6,482	6,501	6,523
Burbank Public Service Dept	319	319	319	320	321	322	323	322	324	325	325	326
Glendale Public Service Dept	337	337	337	338	339	339	340	342	340	340	340	340
Total LADWP Control Area	6,872	6,907	6,948	6,984	7,016	7,046	7,074	7,099	7,123	7,147	7,167	7,189
Imperial Irrigation District Control Area	1,112	1,146	1,182	1,217	1,252	1,288	1,323	1,358	1,394	1,431	1,467	1,504
Total CAISO	52,560	53,332	54,137	54,948	55,779	56,606	57,407	58,198	58,991	59,772	60,535	61,307
Total State	66,243	67,163	68,131	69,101	70,098	71,090	72,051	73,000	73,949	74,880	75,789	76,709
Coincident Demand												
Total CAISO Coincident Demand	51,301	52,055	52,841	53,632	54,444	55,251	56,033	56,805	57,579	58,340	59,085	59,839
Total Statewide Coincident Demand	64,657	65,555	66,499	67,446	68,420	69,387	70,326	71,252	72,178	73,086	73,974	74,872

Form 2.2 - Statewide
California Energy Demand 2008-2018 Staff Revised Forecast
Planning Area Economic and Demographic Assumptions

	Population	Households	Persons per Household	Real Personal Income (Millions 2005\$)	Industrial Value Added (Millions 2005\$)	Resources Extraction and Construction Employment (1,000s)	Commercial Floorspace (MM Sqft.)
1980	23,782,000	8,603,579	2.68	214,234	93,940	34,891	3,551
1981	24,277,600	8,687,725	2.68	219,400	101,579	37,357	3,667
1982	24,804,900	8,750,158	2.70	220,365	108,883	35,567	3,778
1983	25,336,300	8,900,661	2.73	230,091	112,158	34,458	3,874
1984	25,816,000	9,102,067	2.76	251,227	115,916	38,457	3,965
1985	26,402,400	9,350,739	2.77	265,755	116,986	41,350	4,087
1986	27,052,400	9,624,574	2.77	278,746	116,672	43,778	4,238
1987	27,716,900	9,836,740	2.77	289,288	115,348	45,389	4,416
1988	28,393,100	10,055,936	2.77	300,341	117,446	47,403	4,572
1989	29,146,000	10,255,606	2.78	309,205	118,068	50,270	4,748
1990	29,828,685	10,370,841	2.79	315,665	118,619	50,598	4,914
1991	30,458,225	10,543,506	2.80	312,621	115,877	43,000	5,076
1992	30,986,940	10,666,837	2.82	319,780	112,573	37,657	5,207
1993	31,313,835	10,769,701	2.82	317,854	108,103	34,748	5,298
1994	31,523,270	10,864,740	2.81	321,189	107,190	36,528	5,361
1995	31,711,155	10,956,819	2.81	329,304	110,723	38,271	5,420
1996	31,961,985	11,045,744	2.81	340,278	115,511	39,081	5,478
1997	32,451,640	11,139,659	2.83	355,640	138,564	44,040	5,538
1998	32,861,690	11,244,898	2.83	382,606	159,564	47,446	5,614
1999	33,416,925	11,365,709	2.85	402,555	185,026	49,948	5,721
2000	34,015,205	11,462,751	2.88	435,569	230,442	51,966	5,850
2001	34,765,116	11,589,992	2.91	441,936	206,333	53,404	5,977
2002	35,390,103	11,725,991	2.93	442,859	193,444	52,287	6,122
2003	35,972,206	11,869,239	2.94	451,155	199,589	52,077	6,252
2004	36,498,032	12,027,410	2.95	471,882	213,107	55,310	6,356
2005	36,969,213	12,220,028	2.94	485,184	228,351	57,641	6,462
2006	37,428,879	12,372,314	2.94	504,647	236,828	59,773	6,579
2007	37,845,265	12,489,014	2.95	518,546	241,600	59,062	6,704
2008	38,268,432	12,607,457	2.95	534,490	248,334	64,008	6,826
2009	38,698,521	12,727,735	2.96	552,856	253,942	66,372	6,945
2010	39,135,676	12,850,604	2.96	570,589	259,797	66,262	7,057
2011	39,600,532	12,982,378	2.97	588,747	265,604	65,704	7,170
2012	40,072,797	13,116,141	2.97	606,207	271,079	64,998	7,285
2013	40,552,619	13,251,907	2.98	622,119	275,908	64,193	7,402
2014	41,040,145	13,389,734	2.98	637,505	280,431	63,334	7,517
2015	41,535,530	13,529,651	2.99	652,973	285,154	62,775	7,633
2016	42,038,929	13,671,717	2.99	668,158	289,923	62,435	7,747
2017	42,550,503	13,815,953	3.00	682,933	294,480	62,069	7,862
2018	43,070,415	13,962,403	3.00	697,809	298,774	61,543	7,981

Annual Growth Rates (%)

1980-1990	2.3	1.9	0.4	4.0	2.4	3.8	3.3
1990-2000	1.3	1.0	0.3	3.3	6.9	0.3	1.8
2000-2005	1.7	1.3	0.4	2.2	-0.2	2.1	2.0
2005-2008	1.2	1.0	0.1	3.3	2.8	3.6	1.8
2008-2018	1.2	1.0	0.2	2.7	1.9	-0.4	1.6
2006-2018	1.2	1.0	0.2	2.7	2.0	0.2	1.6
	1.8	1.4	0.4	3.4	3.6	2.1	2.4

CHAPTER 2: PACIFIC GAS AND ELECTRIC COMPANY PLANNING AREA

The Pacific Gas and Electric (PG&E) planning area includes (1) PG&E bundled retail customers, (2) customers served by energy service providers (ESPs) using the PG&E distribution system to deliver electricity to end users, and (3) customers of publicly owned utilities, irrigation districts, and other load-serving entities (LSEs) in PG&E's transmission system, with the notable exception of the Sacramento Municipal Utility District (SMUD).¹⁷ SMUD is treated as its own planning area and is discussed in a later chapter.

For purposes of this chapter, the PG&E planning area forecast includes the members of the SMUD control area, Modesto Irrigation District, Roseville, Redding, and direct-service customers of the Western Area Power Administration (WAPA). The PG&E planning area also includes the Turlock Control Area. To support electricity and transmission system analysis, staff uses historic consumption and load data to develop individual forecasts for all utilities in the planning area. Those results are presented in Form 1.5a through 1.5c following Chapter 1. The results in this chapter are for the entire PG&E transmission planning area.

This chapter is organized as follows: first, forecasted consumption and peak loads for the PG&E planning area are discussed; both total and per capita values are presented. The revised values are compared to both the draft 2008 and adopted *CED 2006* forecasts, with differences between the two forecasts explained. A forecast for each of the five climate zones in the planning area is also presented. The forecasted load factor, jointly determined by the consumption and peak load estimates, is also discussed. Second, the chapter presents sector consumption and peak load forecasts. The revised residential, commercial, industrial, and "other" sector forecasts are compared to draft 2008 and *CED 2006* forecasts and, again, differences are discussed. Third, the chapter discusses the forecasts for the Self-Generation Incentive Program (SGIP) and the California Solar Initiative (CSI). Last, estimates of conservation savings from standards, utility and public agency programs, and market and price effects that are included in the baseline forecast are presented.

Planning Area Results

Table 9 presents a comparison of the revised forecast with both the draft 2008 and *CED 2006* electricity consumption forecasts.

¹⁷ The public utilities in the PG&E planning area are Calaveras Public Power Agency; Central Valley Project; Cities of Alameda, Biggs, Gridley, Healdsburg, Lodi, Lompoc, Palo Alto, Redding, Roseville, San Francisco, and Ukiah; Lassen Municipal Utility District; Merced Irrigation District; Modesto Irrigation District; Plumas-Sierra Rural Electric Cooperation; Shasta Dam Area Public Utility District; Silicon Valley Power; Tuolumne County PPA; and Turlock Irrigation District.

In the PG&E planning area, the revised electricity consumption forecast is about 1 percent lower than the draft forecast throughout the majority of the forecast period. This is primarily because of revisions to estimates of 2005 self generation, which lowered the starting point of the forecast. The post-2008 growth rates of the revised and draft forecasts are very similar.

Table 9: PG&E Planning Area Electricity Consumption Forecast Comparison

Consumption (GWH)					
	<i>CED 2006</i>	Staff Draft	Staff Revised	Percent Difference Staff Revised/ <i>CED 2006</i>	Percent Difference Staff Revised/Staff Draft
1990	86,806	86,803	86,803	0.00%	0.00%
2000	101,528	101,334	101,331	-0.19%	0.00%
2005	102,746	102,070	101,460	-1.25%	-0.60%
2008	107,366	108,918	107,929	0.52%	-0.91%
2013	114,863	116,668	115,412	0.48%	-1.08%
2016	118,390	120,942	119,644	1.06%	-1.07%
Average Annual Growth Rates					
1990-2000	1.58%	1.56%	1.56%		
2000-2005	0.24%	0.14%	0.03%		
2005-2008	1.48%	2.19%	2.08%		
2008-2016	1.23%	1.32%	1.30%		
Historic values are shaded					

Source: California Energy Commission, 2007.

Table 10 presents a comparison of the revised 2008 forecast with the draft 2008 forecast and *CED 2006* forecasts for selected years. The revised forecast is very similar to the draft forecast. Use of the new long-term Department of Finance (DOF) population projections shift more population to the hotter areas of the PG&E planning area so that the reduction in electricity consumption forecasts is not translated into a similar reduction in peak forecasts. Staff has increased its projection of 2007 and 2008 peak forecasts from the original projections made in 2005 for the *CED 2006* forecast based on actual temperatures and weather normalized load growth. The revised projections were vetted in public workshops and were adopted by the Energy Commission in June of 2006 and 2007 for use in the CPUC Resource Adequacy process. The recently adopted 2008 peak is used as the starting point of both the revised and draft 2008 peak forecast. The 2008–2016 growth rate of the draft 2008 peak forecast is slightly higher than the revised 2008 forecast.

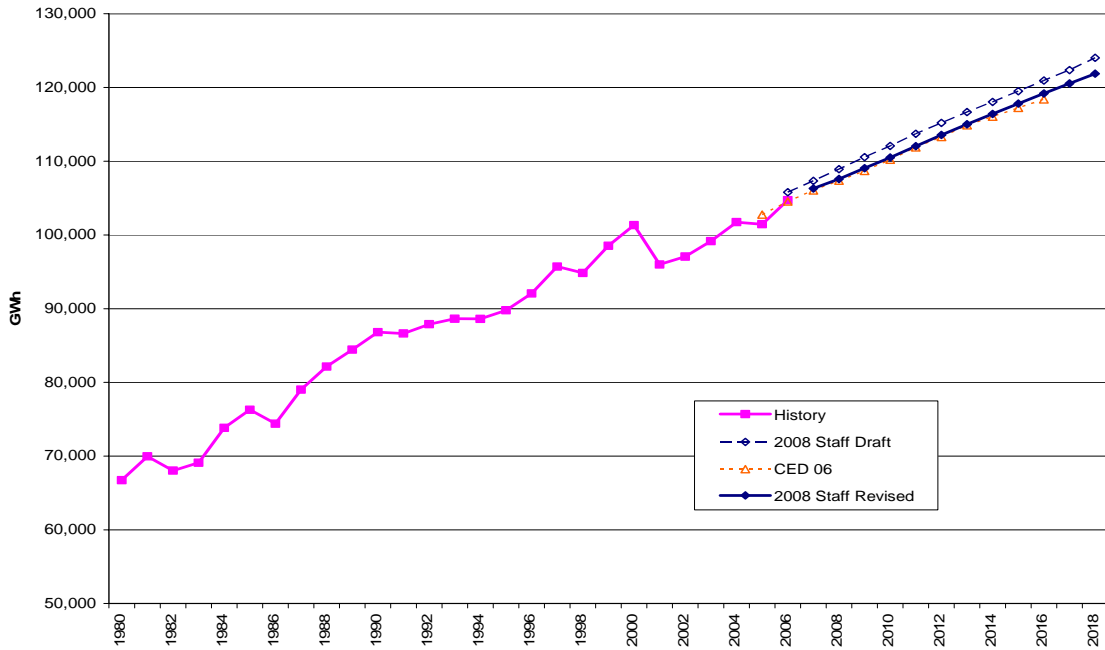
Table 10: PG&E Planning Area Peak Demand Forecast Comparison

	Peak (MW)				
	<i>CED 2006</i>	Staff Draft	Staff Revised	Percent Difference Staff Revised/ <i>CED</i> 2006	Percent Difference Staff Revised/Staff Draft
1990	17,039	17,013	17,055	0.10%	0.25%
2000	20,698	20,666	20,716	0.08%	0.24%
2005	21,162	21,354	21,435	1.29%	0.38%
2008	22,142	23,424	23,413	5.74%	-0.05%
2013	23,761	25,032	25,089	5.59%	0.23%
2016	24,600	25,981	26,096	6.08%	0.44%
Average Annual Growth Rates					
1990-2000	1.96%	1.96%	1.96%		
2000-2005	0.44%	0.66%	0.69%		
2005-2008	1.52%	3.13%	2.99%		
2008-2016	1.32%	1.30%	1.37%		
Historic values are shaded					

Source: California Energy Commission, 2007.

As shown in **Figure 12**, the revised 2008 electricity consumption forecast for the PG&E planning area is uniformly lower than the draft 2008 forecast. This is due to both the use of the revised DOF long-term population forecast and revision to starting point values caused by inclusion of 2006 Quarterly Fuel and Reporting (QFER) data and self-generation estimates. The growth rates of all three forecasts are very similar.

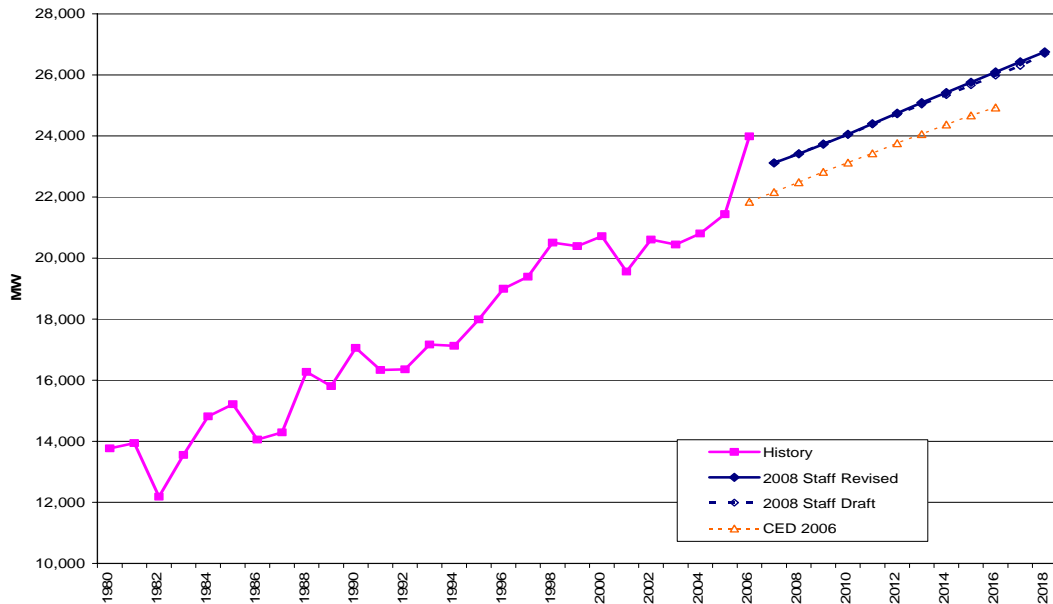
Figure 12: PG&E Planning Area Electricity Forecast



Source: California Energy Commission, 2007.

The revised 2008 PG&E planning area peak demand forecast, shown in **Figure 13**, is essentially the same as the draft forecast. Both the revised and draft 2008 forecasts are higher over the entire forecast period than the *CED 2006* forecast. This increase is due to the annual updates of the peak forecast described earlier in this chapter.

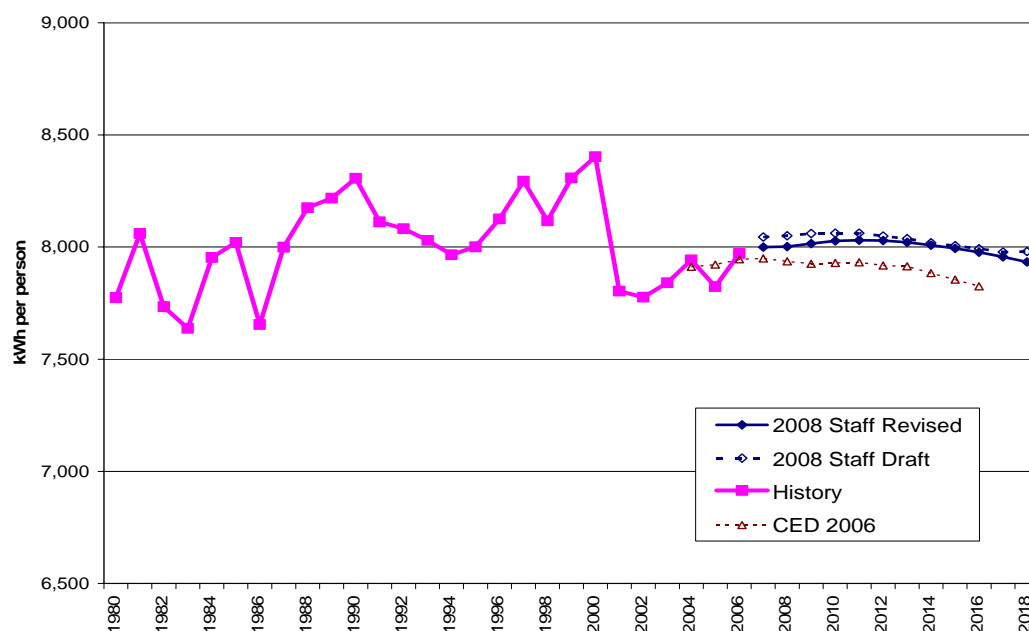
Figure 13: PG&E Planning Area Peak



Source: California Energy Commission, 2007.

Figure 14 provides comparisons of PG&E planning area per capita electricity consumption. The difference in per capita consumption is in the assumed near-term level due to revisions of both consumption estimates and short-term population projections. All forecasts are relatively flat in the short- to mid-term forecast period and decline at the end of the period due to ongoing effects of efficiency improvements and declining industrial use. Evaluation of the 2006 QFER data reduced the starting point differences somewhat. The level of per capita consumption projected in the revised forecast is still projected to be below pre-energy crisis consumption levels.

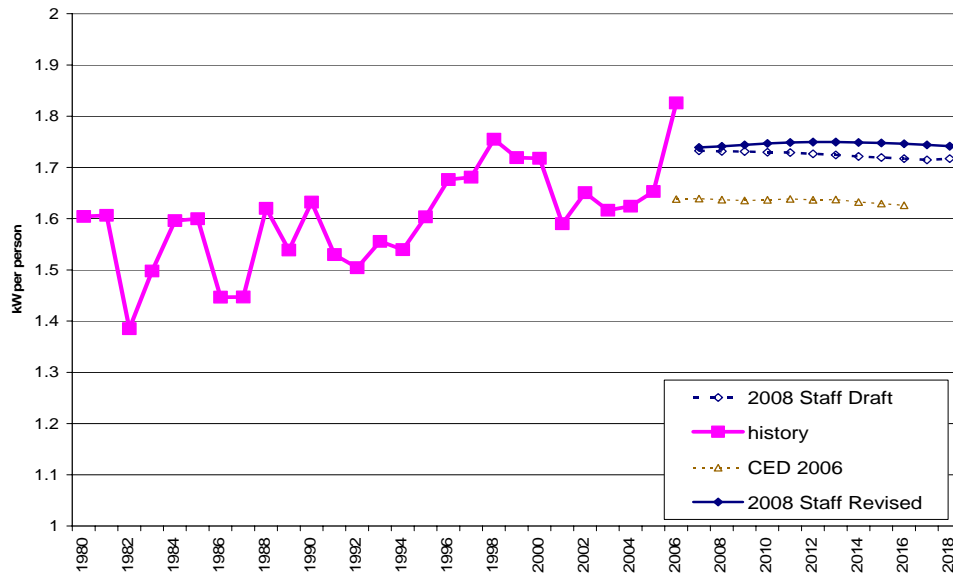
**Figure 14: PG&E Planning Area
Per Capita Electricity Consumption**



Source: California Energy Commission, 2007.

After an upward adjustment in 2007 for calibration and weather, the revised per capita peak demand, shown in **Figure 15**, remains relatively constant throughout the forecast period. This level is slightly higher than the draft per capita peak demand due to an increase in the shift of population to the hotter inland areas of the PG&E planning area than was projected in the previous forecasts. The revised projected level of per capita peak is now estimated to be at a level similar to the mid- to late-1990s, prior to the energy crisis.

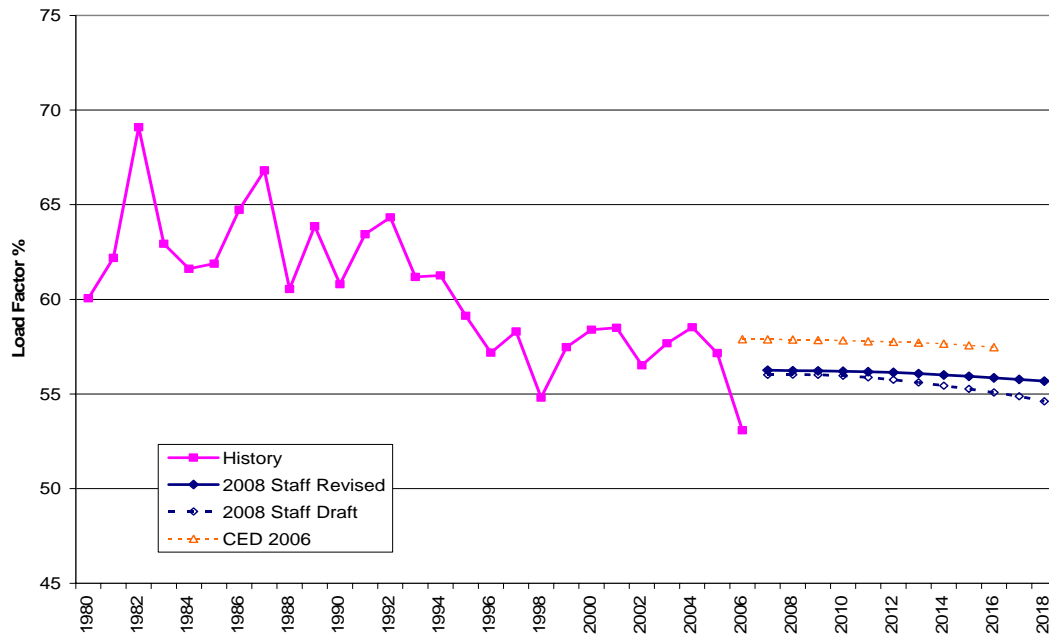
Figure 15: PG&E Planning Area per Capita Peak Demand



Source: California Energy Commission, 2007.

Figure 16 provides a comparison of the respective implied forecast load factors. The load factor is a measure of the increase in peak demand relative to annual electricity consumption. Lower load factors indicate “a needle peak;” higher load factors indicate a more stable load. Actual data show a long-term downward trend as consumption shifts away from the industrial sector and toward the residential and commercial sectors. Further, more population and economic growth in the PG&E planning area is taking place in hotter inland areas, leading to greater saturation of central air conditioning and to a greater use of air conditioning equipment in the cooler Bay Area on the peak day compared to previous historic years. The revised projected load factor is on the low end of the range of annual load factors of recent history. Over the longer forecast period, the load factor declines slightly, which is consistent with higher weather-sensitive load growth in relation to baseload energy growth.

Figure 16: PG&E Planning Area Load Factor



Source: California Energy Commission, 2007.

In the staff forecasting models, the PG&E planning area is composed of five distinct climate zones: Zone 1 (North Coast and Eastern Mountain); Zone 2 (Sacramento area served by PG&E); Zone 3 (northern San Joaquin and northern Sacramento Valley); Zone 4 (East Bay/ Central Coast); and Zone 5 (San Francisco Bay). The purpose of presenting the revised staff forecast results by climate zone is to aid in planning for the differential growth patterns in the climate regions of the PG&E planning area. **Tables 11** and **12** present the PG&E planning area electricity consumption and peak demand forecast by climate zones. The highest growth in the forecast period is projected to occur in the hotter regions (Sacramento and Valley) of the planning area.

Table 11: PG&E Planning Area Electricity Forecast by Climate Zone

Consumption (GWH)					
	Zone 1 North Coast and Mountain	Zone 2 Sacramento Region	Zone 3 Valley Region	Zone 4 East Bay Region	Zone 5 San Francisco Region
1990	4,276	6,301	23,155	31,525	23,065
2000	4,923	9,179	26,021	36,764	26,374
2005	4,977	9,883	27,645	35,194	24,596
2008	5,382	9,663	31,651	36,732	25,316
2013	5,680	10,985	34,110	39,089	26,641
2016	5,849	11,798	35,588	40,370	27,308
Average Annual Growth Rates					
1990-2000	1.42%	3.83%	1.17%	1.55%	1.35%
2000-2005	0.22%	1.49%	1.22%	-0.87%	-1.39%
2005-2008	2.64%	-0.75%	4.61%	1.44%	0.97%
2008-2016	1.05%	2.53%	1.48%	1.19%	0.95%
Historic values are shaded					

Source: California Energy Commission, 2007.

Table 12: PG&E Planning Area Peak Forecast by Climate Zone

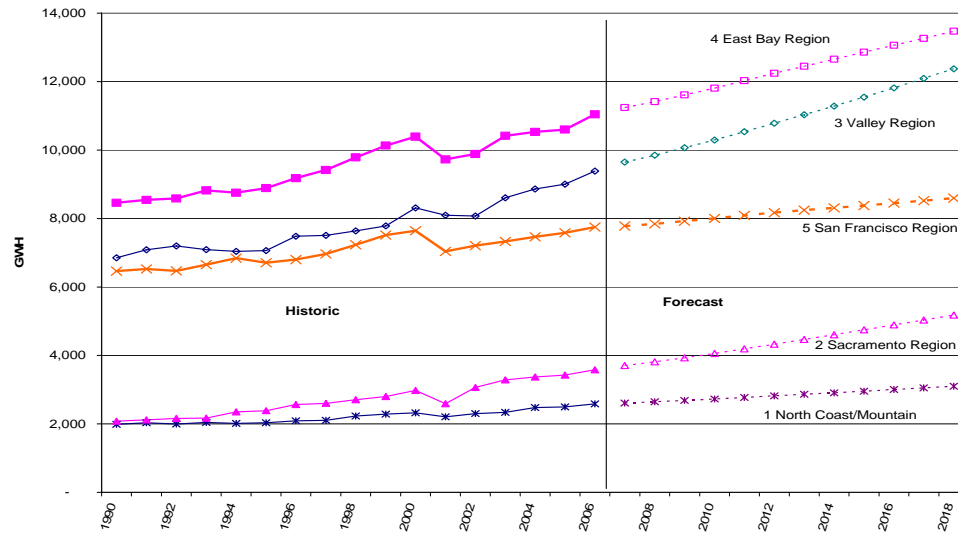
Peak (MW)					
	Zone 1 (North Coast and Mountain)	Zone 2 (Sacramento Region)	Zone 3 (Valley Region)	Zone 4 (East Bay Region)	Zone 5 (San Francisco Region)
1990	641	1,800	6,591	5,043	3,080
2000	922	2,223	7,476	6,562	3,643
2005	822	2,537	8,283	6,176	3,689
2008	904	2,738	8,298	7,809	3,664
2013	970	3,094	8,866	8,352	3,807
2016	1,009	3,321	9,214	8,676	3,877
Average Annual Growth Rates					
1990-2000	3.70%	2.13%	1.27%	2.67%	1.69%
2000-2005	-2.27%	2.68%	2.07%	-1.21%	0.25%
2005-2008	3.23%	2.57%	0.06%	8.13%	-0.23%
2008-2016	1.38%	2.44%	1.32%	1.32%	0.71%
Historic estimates are shaded					

Source: California Energy Commission, 2007.

Figures 17 and 18 present graphs of the revised electricity and peak demand forecasts, respectively, by climate zone. The fastest growing areas are the hotter inland regions followed closely by the East Bay region. The historic electricity values in Figure 17 are based on historic consumption by county aggregated to the climate zone level. Because the climate zone definitions do not necessarily correspond to specific physical subsets of the electric grid, no precisely comparable information exists to determine historic peak demand by climate zone. At this time the historic peak estimates by climate zone are based on staff load model results, calibrated to

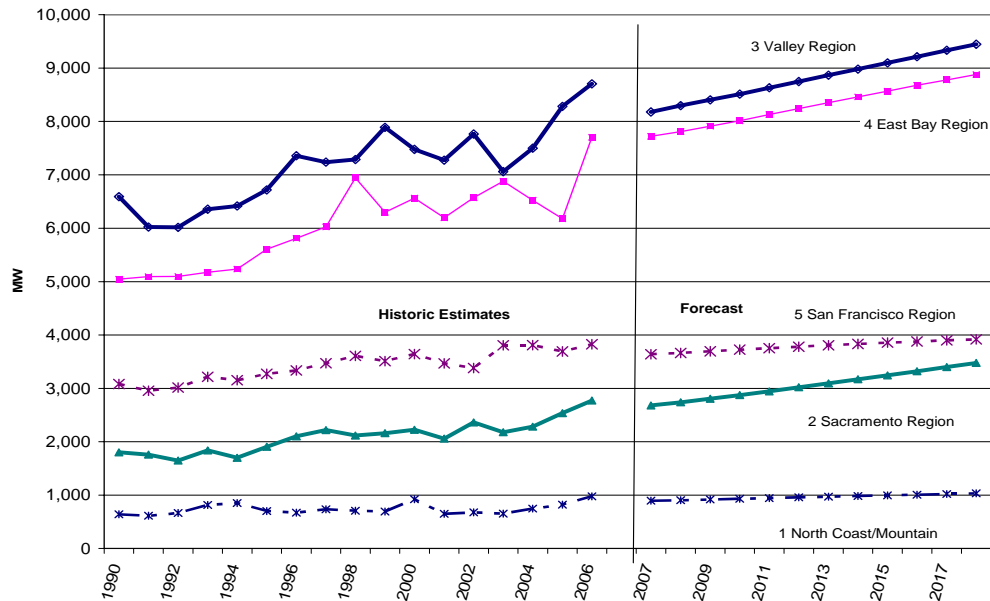
individual load-serving entity historic loads to produce a forecast by load-serving entity and control area. Staff will investigate alternative strategies for calibrating the climate zone forecast.

Figure 17: PG&E Planning Electricity Forecast by Climate Zone



Source: California Energy Commission, 2007.

Figure 18: PG&E Planning Area Peak Forecast by Climate Zone



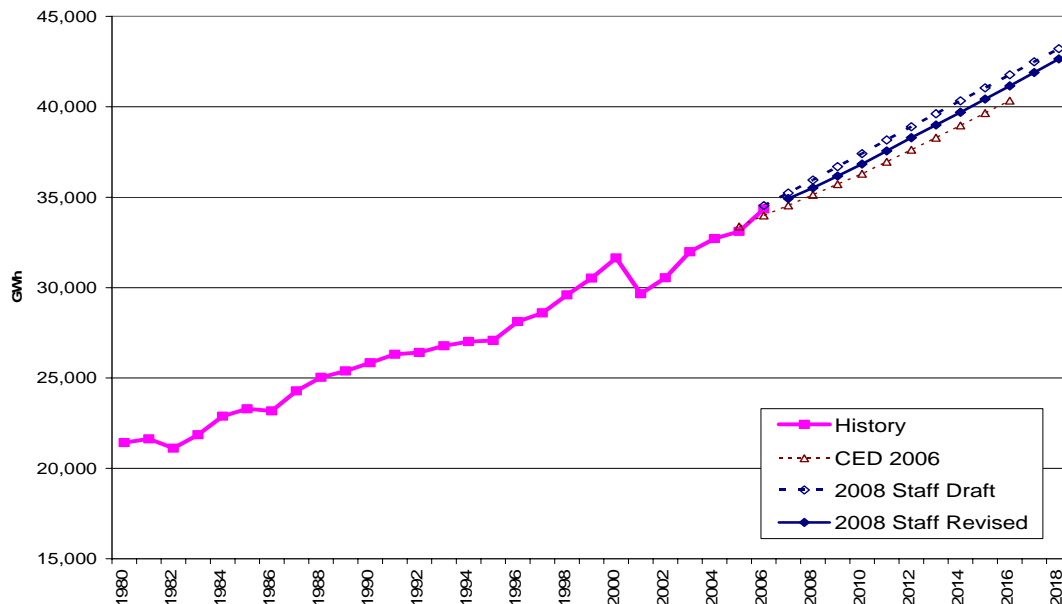
Source: California Energy Commission, 2007.

Sector Level Results and Input Assumptions

Residential Sector

Figure 19 provides a comparison of the revised 2008 PG&E planning area residential forecast to both the draft 2008 forecast and the *CED 2006* forecast. The revised 2008 forecast is lower than the draft 2008 forecast throughout the forecast period due to lower residential economic and demographic projections. The revised DOF long-term population forecast lowered population in the Bay Area where per capita income is higher and increased population in the inland valley areas where per capita income is lower. The net result was both a slightly lower household forecast and lower household income forecast. The growth rate of the revised 2008 forecast is slightly lower than in the draft 2008 forecast.

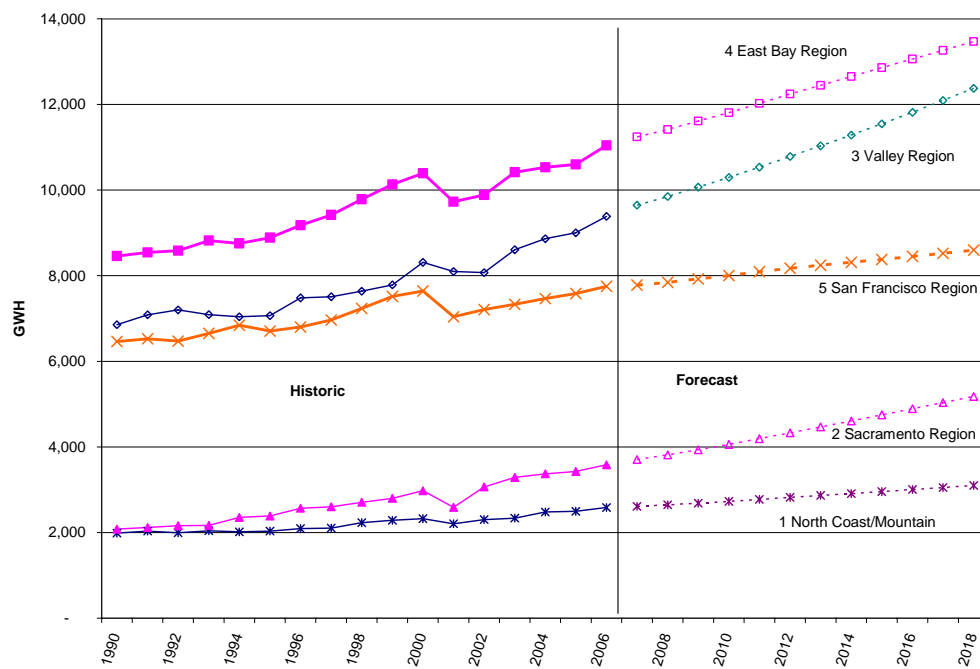
Figure 19: PG&E Planning Area Residential Consumption



Source: California Energy Commission, 2007.

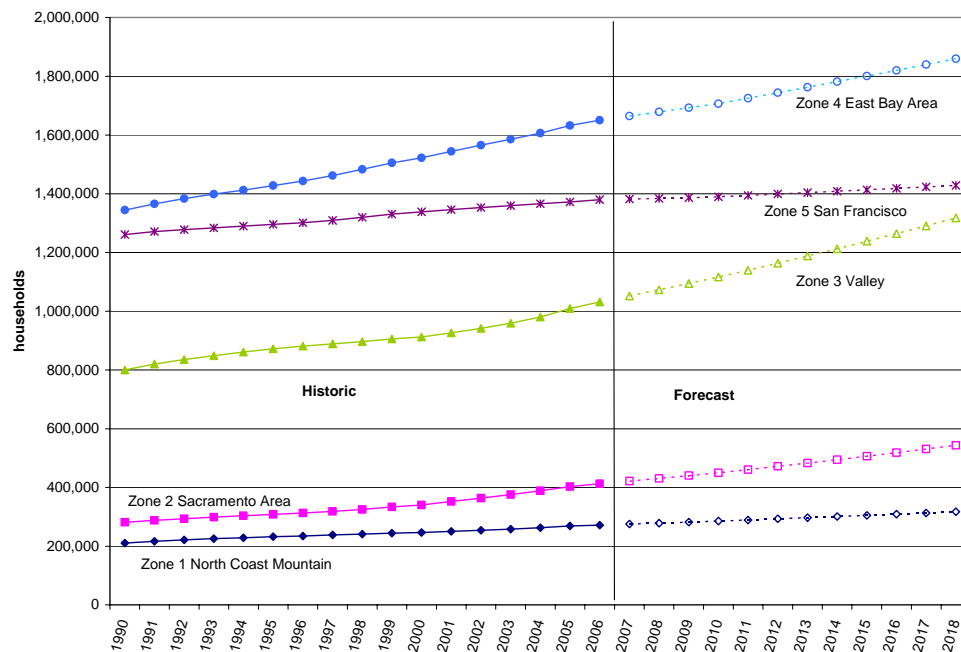
Figure 20 shows the revised forecast by climate zone for the PG&E planning area. While the East Bay region is still the largest area and continues to grow, the largest forecasted growth is coming from the Valley region. The electricity consumption forecast is consistent with the projected household growth by climate zone, shown in **Figure 21**.

Figure 20: PG&E Planning Area Residential Electricity Forecast by Climate Zone



Source: California Energy Commission, 2007.

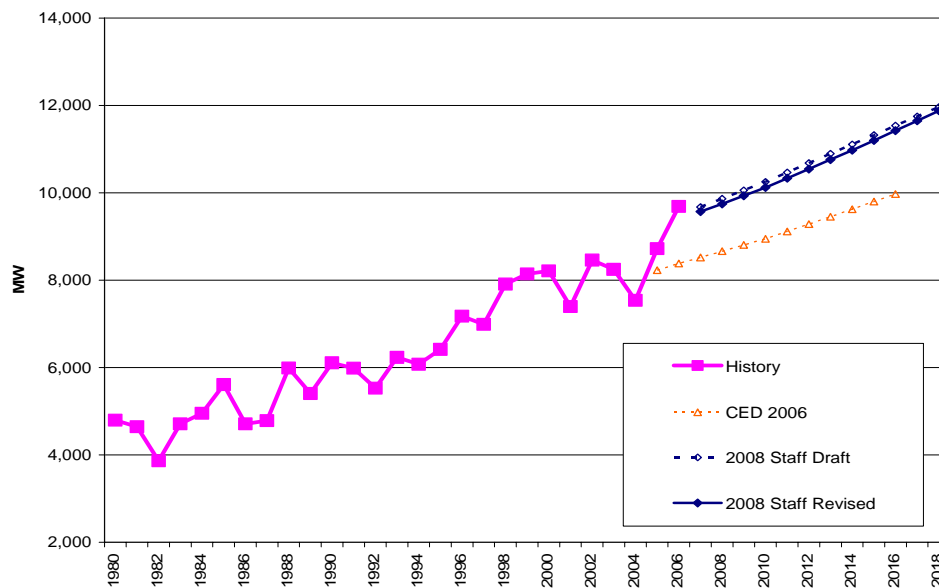
Figure 21: PG&E Planning Area Households by Climate Zone



Source: California Energy Commission, 2007.

Figure 22 provides a comparison of the revised and draft 2008 and *CED 2006* residential peak demand forecasts. As in the electricity consumption forecast, the revised 2008 residential peak forecast is slightly lower than the draft 2008 forecast. The difference between the revised and draft 2008 peak forecasts is slightly smaller than in the electricity forecast due to the shift of population to the hotter inland areas of the planning area. Also, savings from 2005 federal air conditioner standards are assumed to have an impact on annual electricity consumption but not on peak demand.

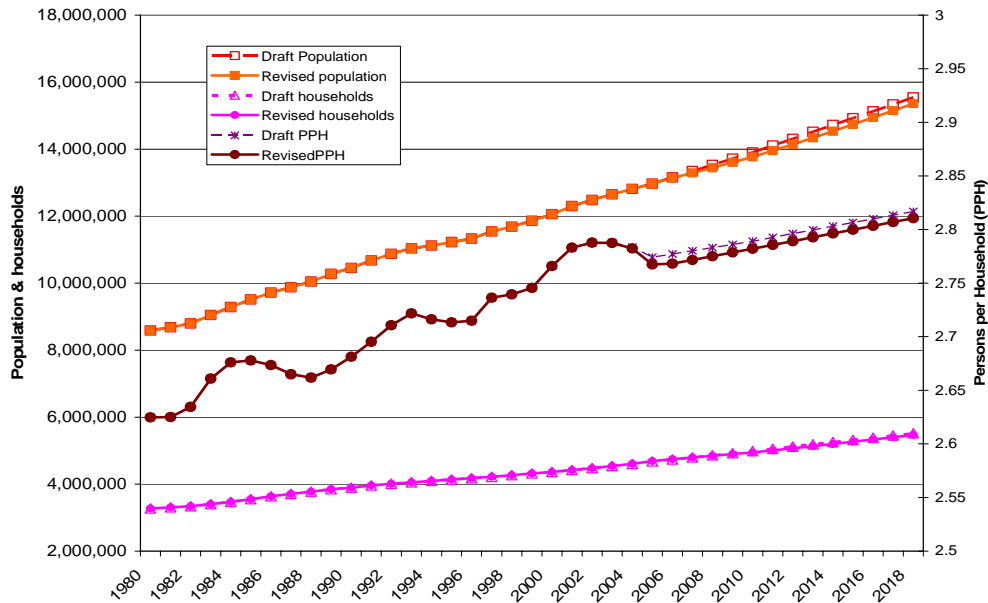
Figure 22: PG&E Planning Area Residential Peak



Source: California Energy Commission, 2007.

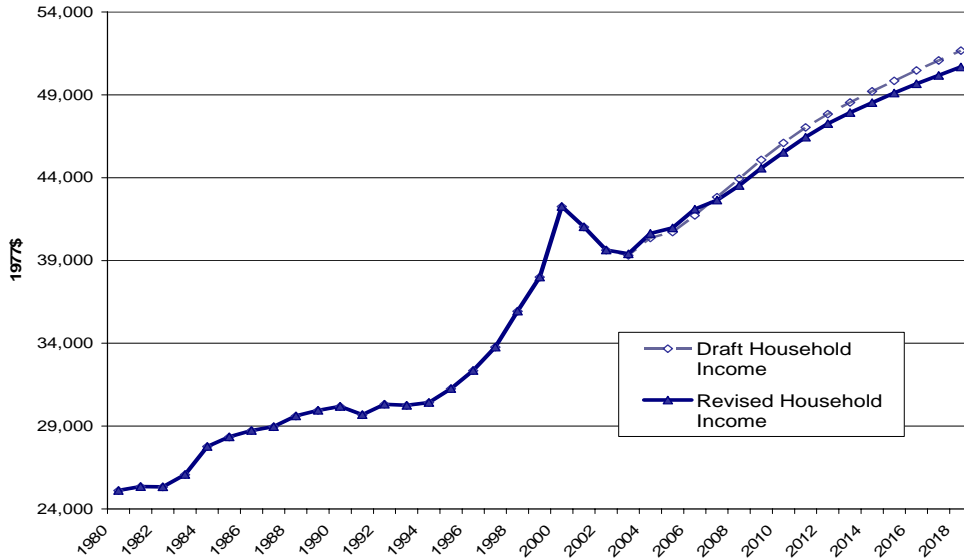
Figures 23 and 24 provide comparisons of the residential drivers used in the revised 2008 forecast with those used in the draft 2008 forecast. Figure 23 provides comparisons of the total population, total households, and persons per household projections. The revised 2008 forecast of total population and households is slightly lower than in the draft 2008 forecast. The new, lower population forecast is somewhat offset by a lower persons per household forecast. The net result at the planning area level is a slightly lower household forecast. Figure 24 provides a comparison of household income (per capita income multiplied by persons per household) between the two forecasts. The revised 2008 estimate of household income is lower than that projected in the draft 2008 forecast partly due to the shift in population to locations in the planning area which have lower per capita income.

Figure 23: PG&E Planning Area Residential Demographic Projections



Source: California Energy Commission, 2007.

Figure 24: PG&E Planning Area Household Income Projections

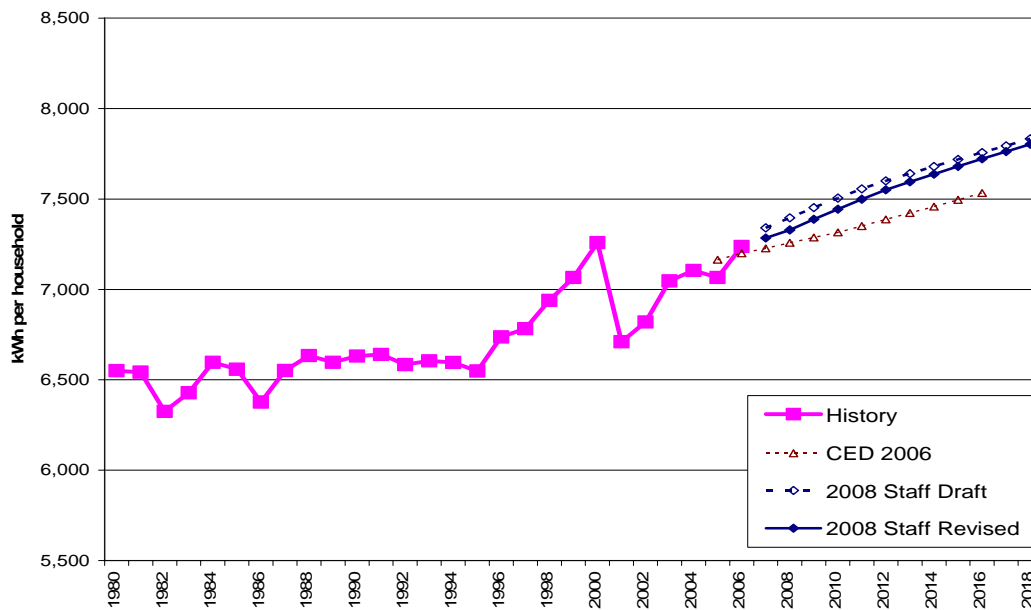


Source: California Energy Commission, 2007.

Figures 25 and 26 represent a comparison of electricity use per household between the revised 2008 forecast and the previous forecasts. Figure 25 is a comparison of annual use per household, and Figure 26 presents a comparison of peak use per household. The revised 2008 forecast of electricity use per household is lower than the draft 2008 forecast. This is caused by lower persons per household projections and a lower household income forecast. The difference is less pronounced in peak

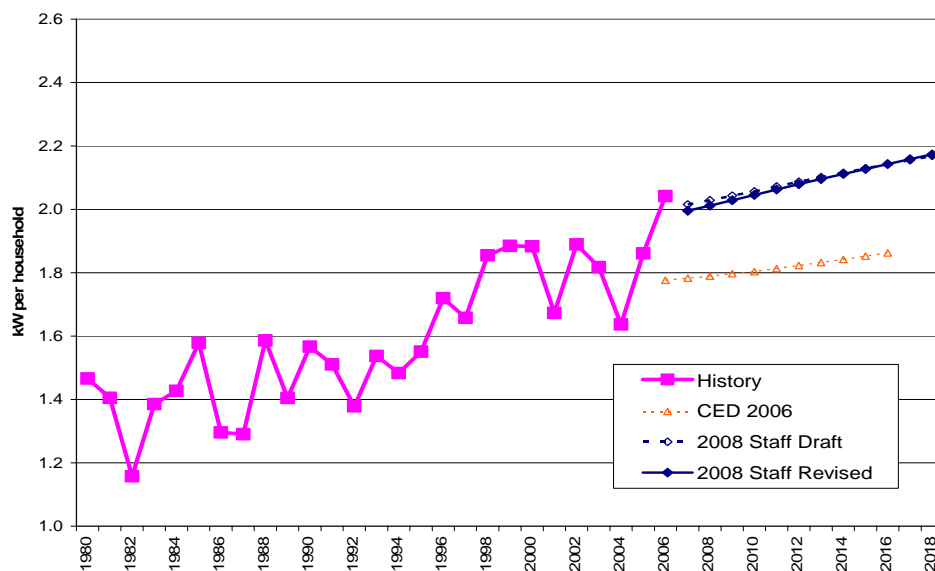
use per household due to a shift in households to the hotter inland climates. The growth rate of the revised 2008 electricity use per household forecast is similar to the draft 2008 forecast while the growth rate of the revised 2008 peak use per household is slightly higher than the draft 2008 forecast, reflecting growth in the hotter areas.

Figure 25: PG&E Planning Area Use per Household



Source: California Energy Commission, 2007.

Figure 26: PG&E Planning Area Peak Use per Household

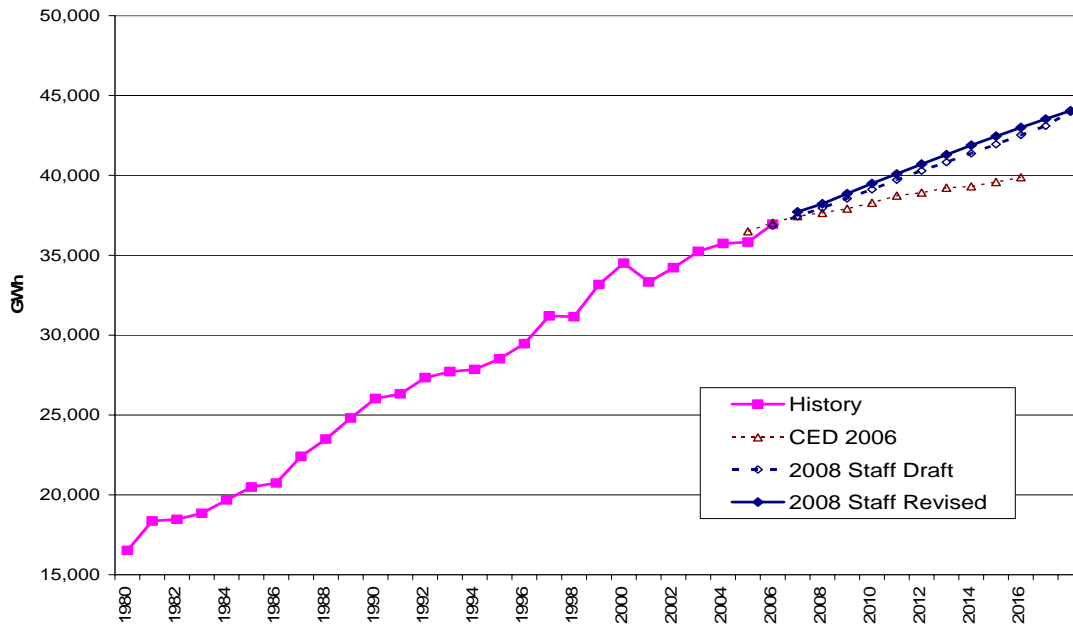


Source: California Energy Commission, 2007.

Commercial Building Sector

Figure 27 provides a comparison of the commercial building sector forecasts. The revised 2008 forecast is slightly higher throughout the forecast period than the draft 2008 forecast. This is caused by a slightly higher starting point of the commercial forecast due to inclusion of 2006 consumption data in the historic period. The growth rate is similar; the higher forecasted levels of lighting intensity are offset by a lower forecast of floor space.

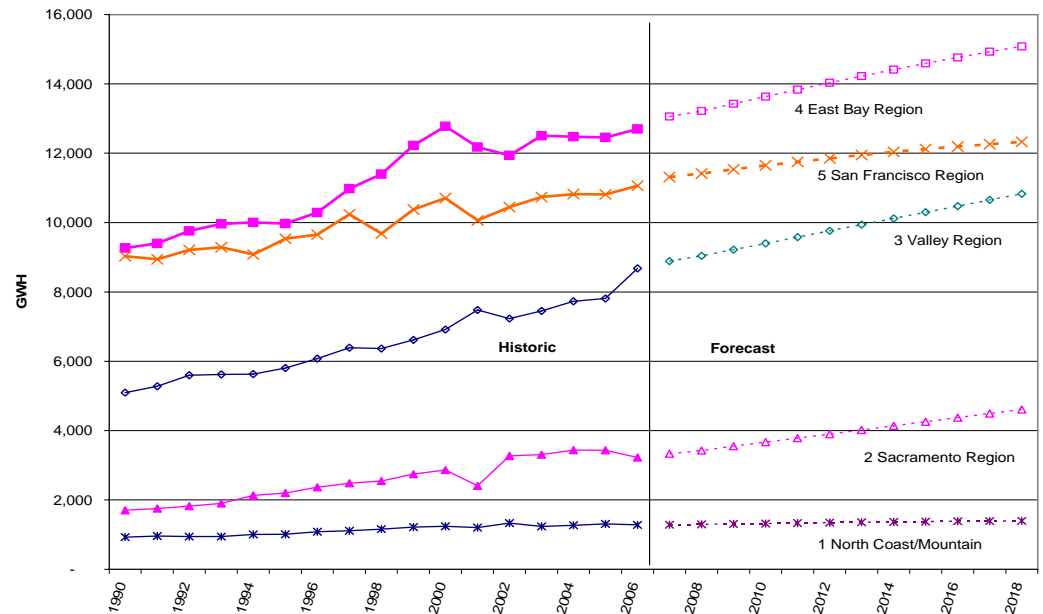
Figure 27: PG&E Planning Area Commercial Consumption



Source: California Energy Commission, 2007.

Figure 28 shows the PG&E commercial electricity forecast by climate zone. For the commercial sector, the fastest growing regions are the East Bay and Sacramento Valley regions.

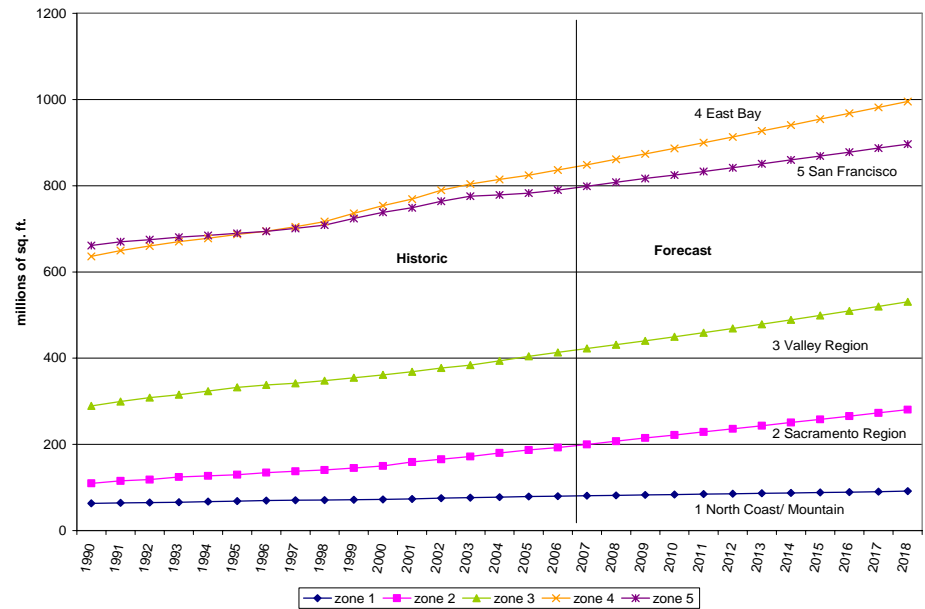
Figure 28: PG&E Planning Area Commercial Electricity Consumption by Climate Zone



Source: California Energy Commission, 2007.

Figure 29 presents the revised 2008 forecast of commercial floor space by climate zone. Floor space in the East Bay region and Valley regions are growing at the fastest rate.

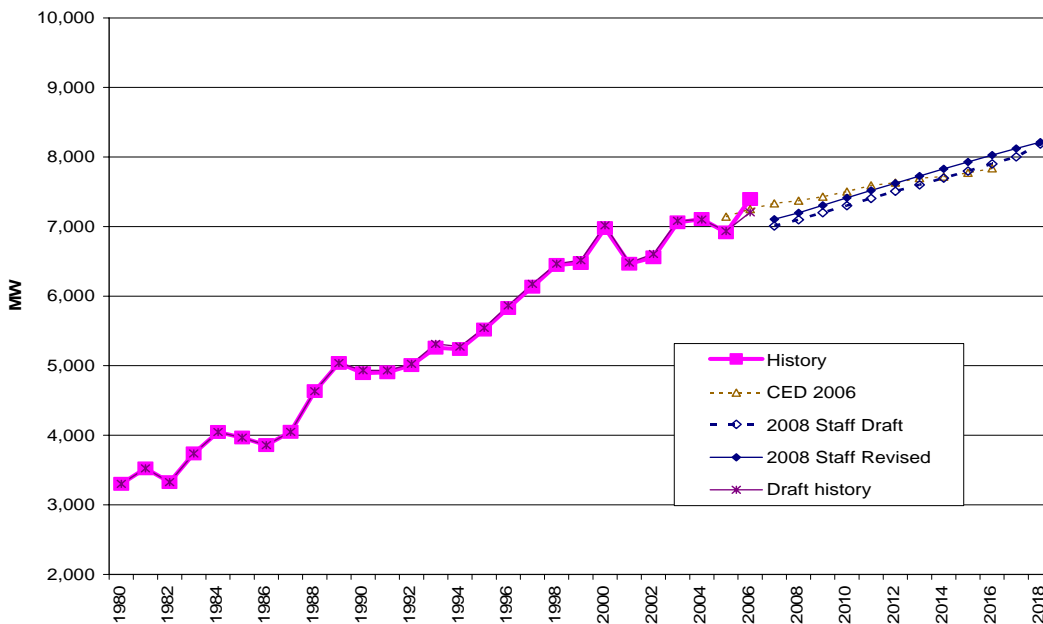
Figure 29: PG&E Planning Area Commercial Floor Space by Climate Zone



Source: California Energy Commission, 2007.

Figure 30 provides a comparison of the commercial peak demand forecasts. Growth in both forecasts is driven primarily by the underlying electricity consumption forecast and exhibits a similar pattern.

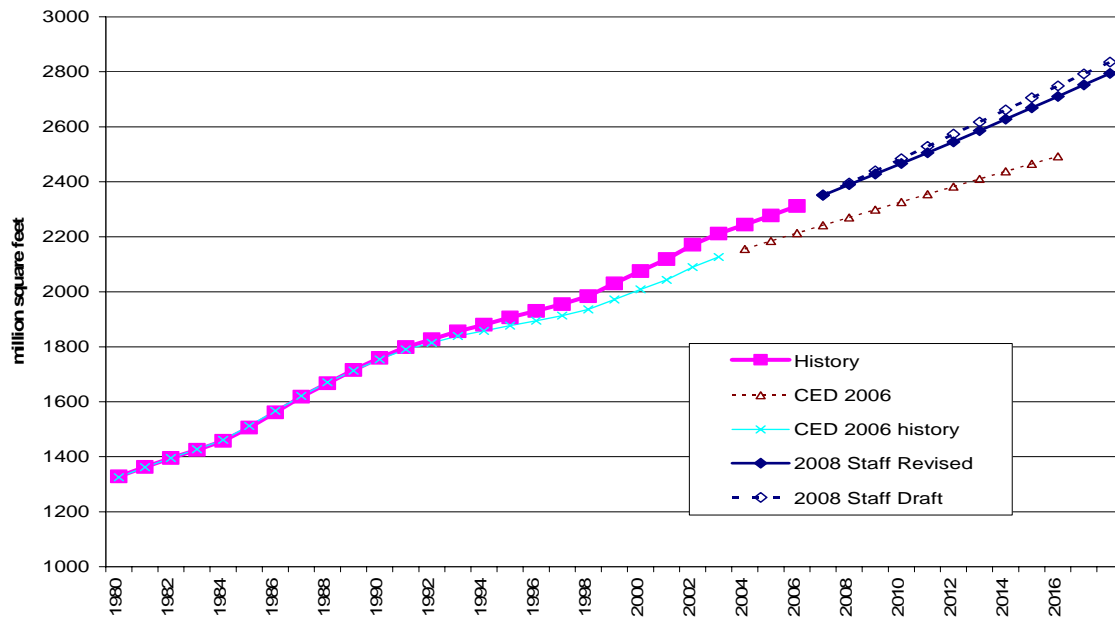
Figure 30: PG&E Planning Area Commercial Sector Peak



Source: California Energy Commission, 2007.

In staff's commercial building sector forecasting model, floor space by building type, such as retail, offices, and schools, is the key driver. **Figure 31** provides a comparison of total commercial floor space projections and historic estimates used in the two forecasts. In the latter part of the forecast period, the revised 2008 forecast is slightly lower than the draft 2008 forecast due to revisions in the economic and demographic projections used to derive commercial floor space estimates.

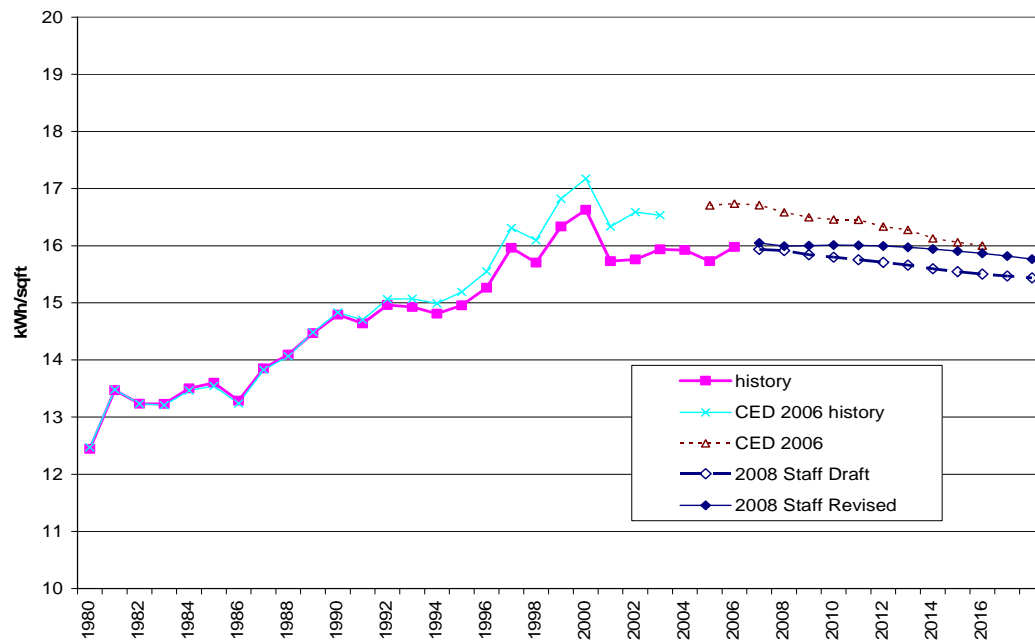
Figure 31: PG&E Planning Area Commercial Floor Space



Source: California Energy Commission, 2007.

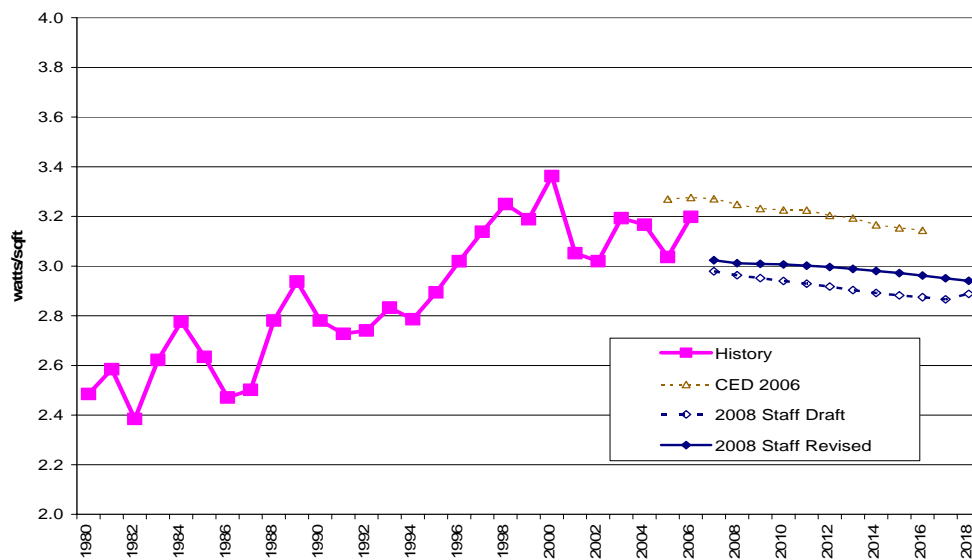
Historic and projected commercial sector annual and peak use per square foot are shown in **Figures 32** and **33**, respectively. Changes in annual use per square foot are based on changes in historic floor space estimates and are also presented in Figure 32. Use per square foot in the revised 2008 forecast starts at a slightly higher value for both the electricity and peak forecasts. This is caused by revisions to both historic consumption estimates and updating historic square footage estimates. The revised 2008 forecast of annual use per square foot remains relatively constant in the first half of the forecast period and declines slightly in the second half of the forecast period due to effects of building and appliance standards and other conservation efforts.

Figure 32: PG&E Planning Area Commercial kWh per Square Foot



Source: California Energy Commission, 2007.

Figure 33: PG&E Planning Area Commercial Sector Peak Watts per Square Foot

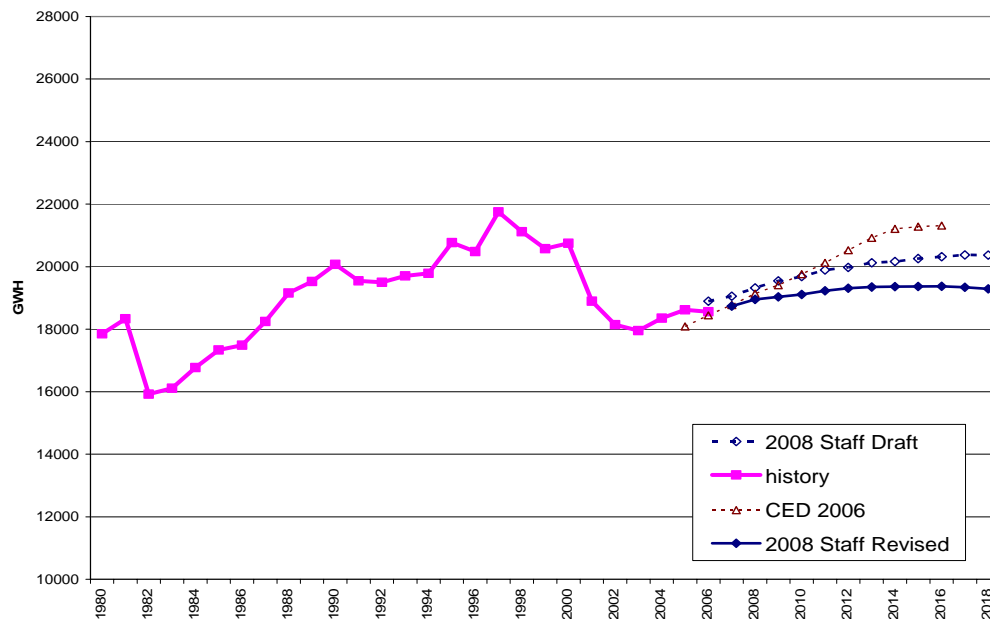


Source: California Energy Commission, 2007.

Industrial Sector

Figure 34 provides comparisons of the PG&E planning area industrial sector electricity consumption forecasts. The revised 2008 industrial consumption forecast is lower than the draft 2008 forecast due to a lower starting point. The projected growth in the revised 2008 forecast is also somewhat less than was projected in the draft 2008 forecast because assumptions about energy intensity trends were revised for each industry to be more consistent with recent historic patterns. The higher starting point of the draft 2008 forecast is, in part, a result of distributing previously unclassified consumption into the industrial sector based on revised QFER filings by various utilities.

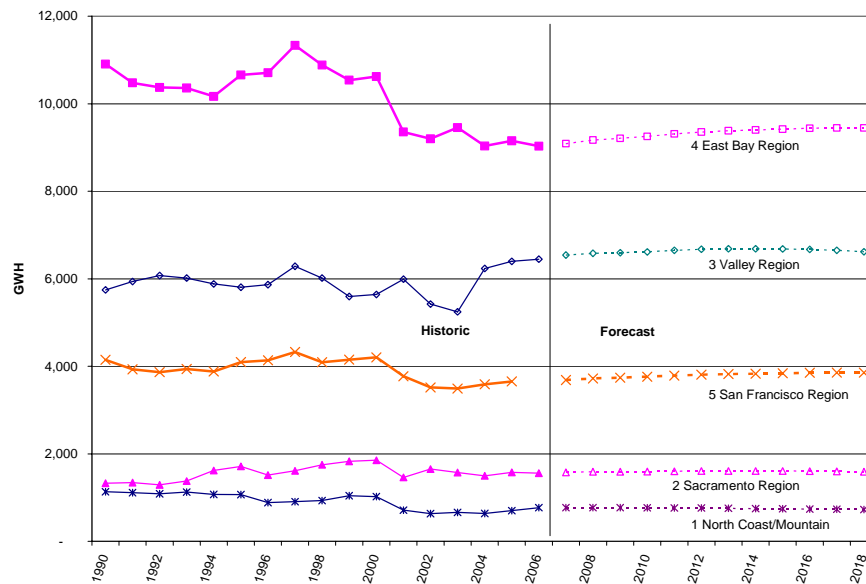
Figure 34: PG&E Planning Area Industrial Consumption



Source: California Energy Commission, 2007.

Figure 35 presents the PG&E industrial sector forecast by climate zone. The industrial sector forecast slightly increases in the East Bay region. In all other regions the forecast is either constant or declining slightly.

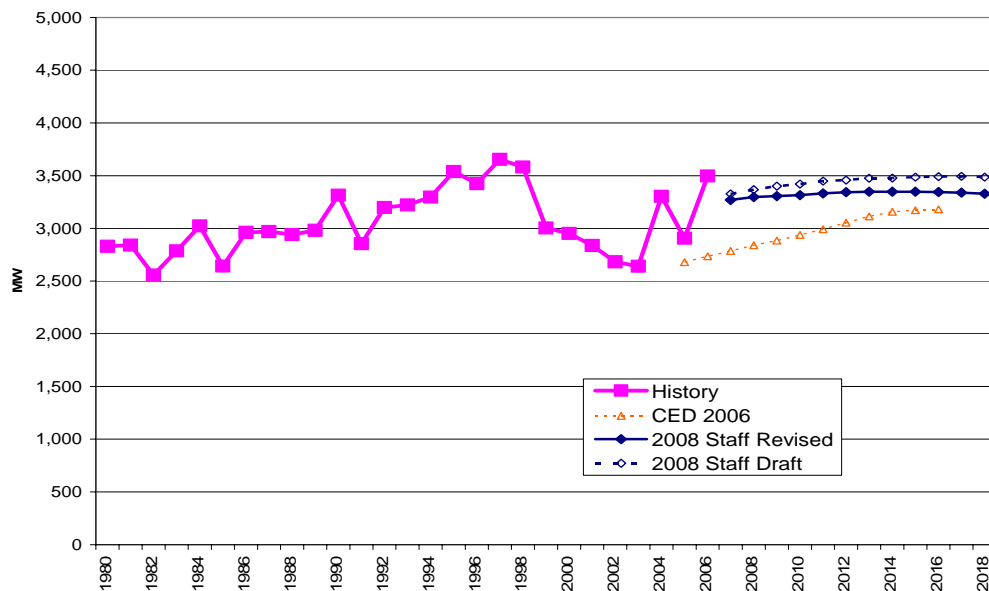
Figure 35: PG&E Planning Area Industrial Forecast by Climate Zone



Source: California Energy Commission, 2005.

Figure 36 provides a comparison of the industrial sector peak forecasts. The revised 2008 peak forecast is lower than the draft 2008 peak forecast which is consistent with the differences in electricity forecast.

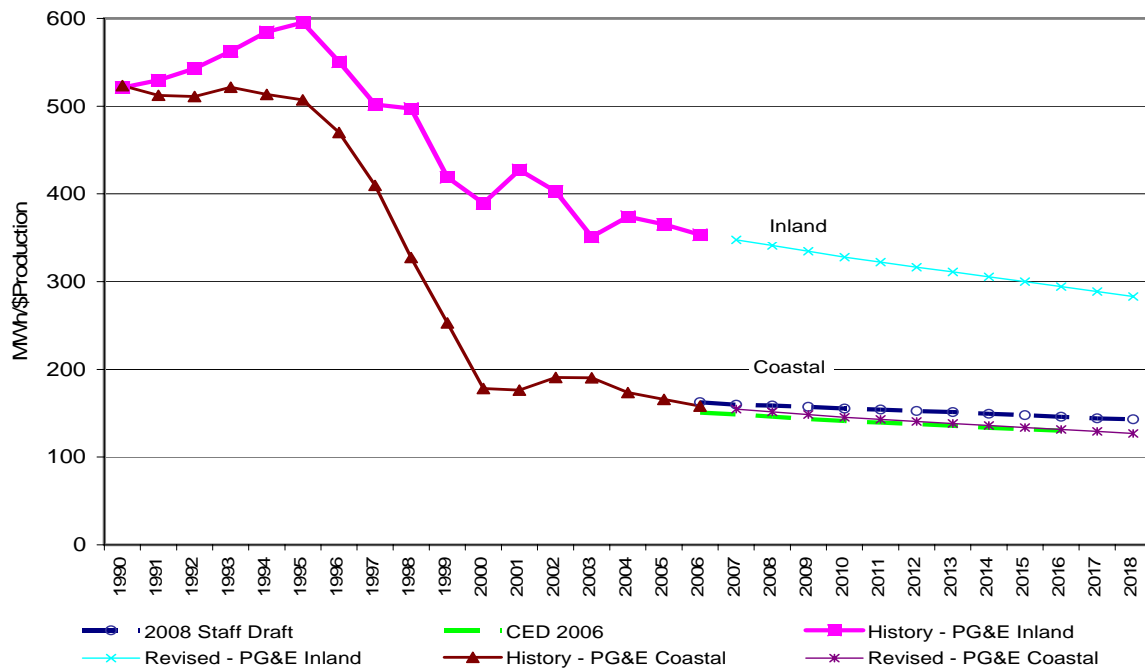
Figure 36: PG&E Planning Area Industrial Sector Peak



Source: California Energy Commission, 2007.

Figure 37 provides a comparison of electricity use per dollar of industrial production value between the revised 2008 forecast and previous forecasts. In the revised 2008 forecast, industrial production drivers were developed for both inland and coastal regions in order to facilitate a climate zone specific industrial forecast for the PG&E planning area. The drivers in both regions now decline at a faster rate than was projected in the draft 2008 forecast. This is a continuation of the recent historic trend, which is in contrast to the rapid decline seen in the 1994–2000 period.

Figure 37: PG&E Planning Area Industrial Sector Use per Production Unit

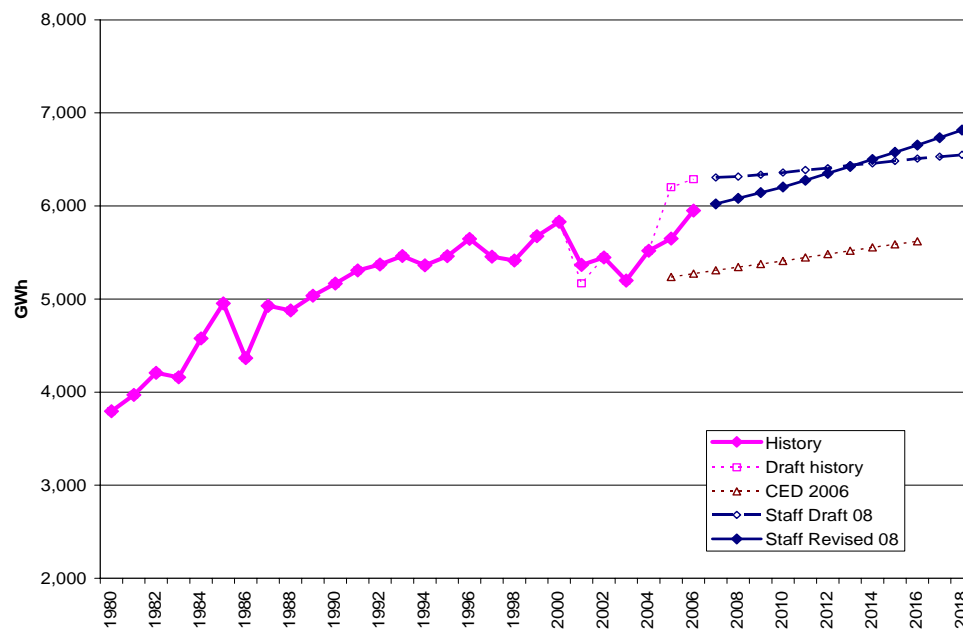


Source: California Energy Commission, 2007.

Other Sectors

Figure 38 provides a comparison of the electricity consumption forecasts for the transportation, communication, and utilities and streetlighting sectors. The revised 2008 transportation, communication, and utilities and streetlighting forecast starts from a lower point than the draft 2008 forecast, but the projected growth is higher. This results in a higher forecast in the latter portion of the forecast period. The starting point difference is a result of reallocation of previously unclassified consumption and revisions to estimates of historic self generation.

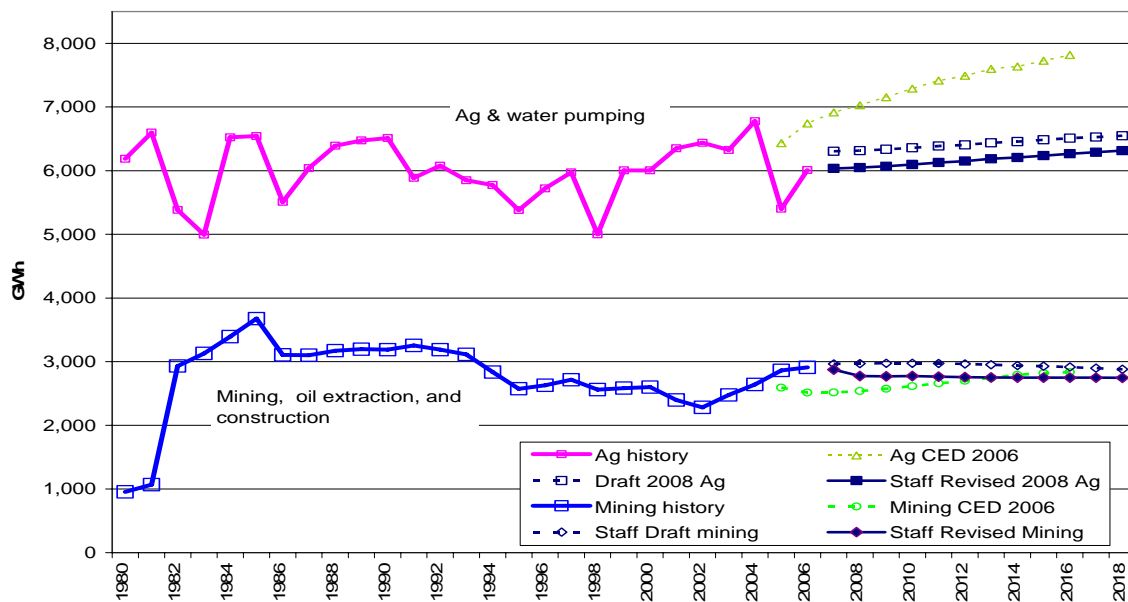
Figure 38: PG&E Planning Transportation, Communication, and Utilities and Streetlighting Sector Electricity Forecasts



Source: California Energy Commission, 2007.

Figure 39 provides a comparison of the electricity consumption forecasts for the agriculture and water pumping and mining and oil extraction sectors. The revised 2008 agriculture and water pumping forecast is lower than the draft 2008 forecast due to a decrease in the recent history of surface water pumping. This lower level of surface water pumping is expected to continue. The revised 2008 mining and oil extraction sector forecast is lower than the draft 2008 forecast based on revised energy intensity assumptions. The draft 2008 forecast is projected to remain fairly constant because of constraints on future capacity expansion.

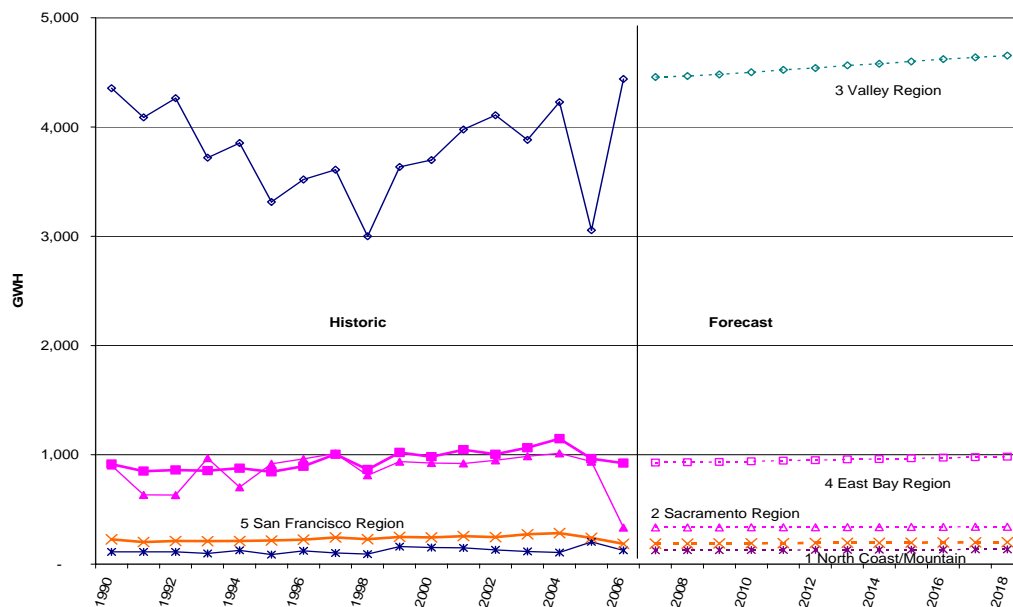
Figure 39 PG&E Planning Area Other Sector Electricity Forecasts (Agriculture and Water Pumping and Mining and Oil Extraction)



Source: California Energy Commission, 2007.

Figure 40 provides PG&E agriculture and water pumping forecast by climate zone. This sector is dominated by the inland valley region due to its agricultural base.

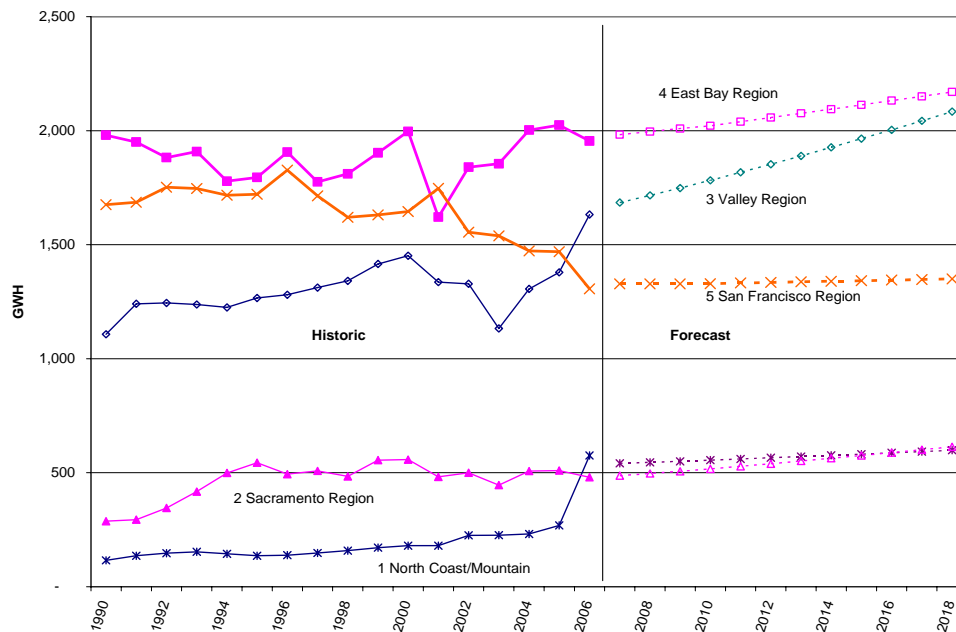
Figure 40: PG&E Planning Area Agriculture and Water Pumping Electricity Forecast by Climate Zone



Source: California Energy Commission, 2007.

Figure 41 presents the remainder of the Other sector (Transportation, Communication, and Utilities and Streetlighting forecast combined with the Mining and Oil Extraction forecast by climate zone) forecasts by climate zone. The forecast for climate zone 3 (Valley) is higher due to the increased forecast of mining and oil extraction in that region.

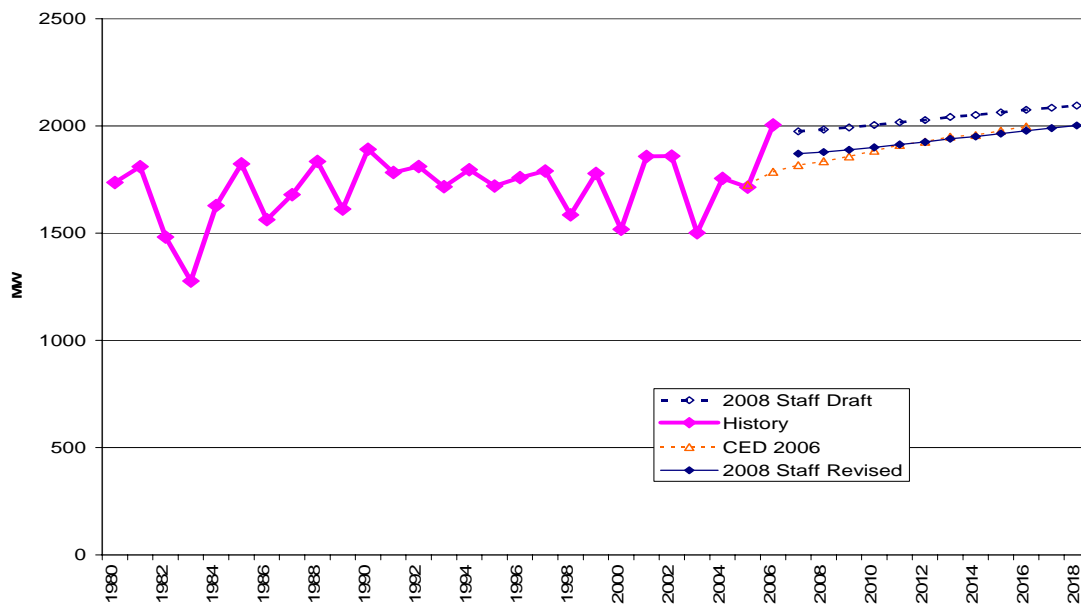
Figure 41: PG&E Planning Area Other (Transportation, Communication, and Utilities; Streetlighting; Mining and Oil Extraction) Sector Electricity Forecasts by Climate Zone



Source: California Energy Commission, 2007.

Figure 42 provides a comparison combined peak forecast for these sectors. The revised 2008 forecast is lower over the entire forecast period than the draft 2008 forecast. This is caused by lower underlying electricity consumption forecasts.

Figure 42: PG&E Planning Area Other Sector Peak



Source: California Energy Commission, 2007.

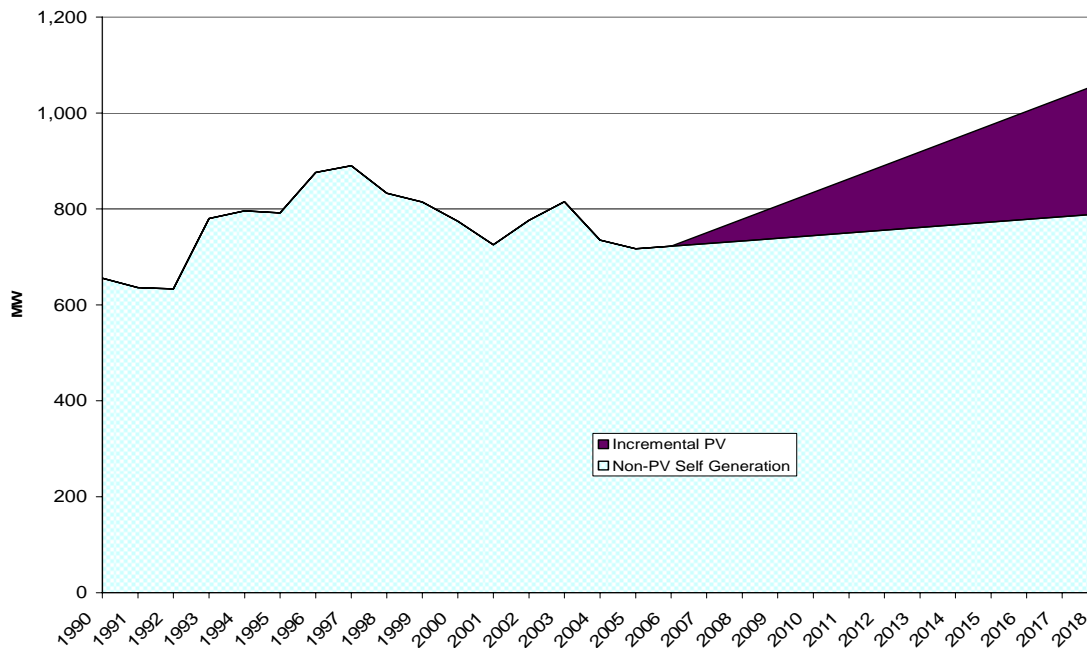
Electricity Prices

As in the draft forecast, the revised 2008 forecast used prices which are held constant (in real terms) at the 2005 level for all sectors. This is in contrast to the declining price forecast that was used in the *CED 2006* price forecast.

Self Generation

As discussed in Chapter 1, the peak demand forecast is reduced by the projected effects of the SGIP, CSI, and other similar programs. The impacts of these programs are forecast based on recent trends in installations. **Figure 43** shows the staff forecast of impacts from all non-PV and the incremental impact of new PV installations. Based on current trends, staff projects about 28 MW per year of additional peak reduction from self generation, mostly from new PV systems.

Figure 43: PG&E Planning Area Self-Generation Peak Forecast



Source: California Energy Commission, 2007.

Conservation Savings Embedded in the Forecast

As discussed in Chapter 1, savings from building and appliance standards through 2005 are modeled in the Energy Commission residential and commercial demand forecast models. Savings from historic public agency and utility programs funded through 2008 are also included. To estimate the magnitude of these savings, the models are operated in a series of runs eliminating these programs in the reverse chronological order of the programs' occurrence. The savings are then calculated by subtracting the results of the run with the program in effect from the results without the program in effect. A condensed version of the results of this analysis is presented here as a partial estimate of conservation effects embedded in the revised forecast; see Chapter 1 for a detailed discussion of the relationship between forecast assumptions and utility program plans. **Table 13** presents electricity consumption savings, by broad program category, for selected years. **Table 14** presents similar estimates of peak savings.

It should be noted that all savings are ultimately measured against a baseline prior to 1975, the year in which the first standards were introduced. For the PG&E planning area, in particular, this choice of base year produces a large volume of savings from price effects, as PG&E commercial prices increased significantly between 1975 and 1979. Savings from price effects would be substantially lower if a more recent base year were chosen from which to measure savings.

Table 13: PG&E Planning Area Electricity Conservation Savings Estimates

	1990	2000	2005	2008	2013	2018
Residential Energy Savings (GWH)						
Building Standards	1010	2039	2533	2836	3379	3989
Appliance Standards	1190	2911	3732	4125	4749	5351
Utility and Public Agency Programs	649	1014	778	699	579	503
Market and Price Effects	67	96	112	119	133	149
Total Residential Savings	2916	6061	7155	7780	8840	9992
Commercial Energy Savings (GWH)						
Building Standards	518	1277	1739	2104	2845	3660
Appliance Standards	278	884	1157	1365	1739	2129
Utility and Public Agency Programs	168	612	799	1003	986	967
Market and Price Effects	6586	4743	8895	9587	10593	11430
Total Commercial Savings	7551	7515	12590	14059	16163	18186
Total Energy Savings	10467	13576	19745	21839	25003	28178

Source: California Energy Commission, 2007.

Table 14: PG&E Planning Area Peak Conservation Savings Estimates

	1990	2000	2005	2008	2013	2018
Residential Peak Savings (MW)						
Building Standards	637	1295	1612	1737	1960	2226
Appliance Standards	155	378	485	536	617	696
Utility and Public Agency Programs	232	363	284	258	217	191
Market and Price Effects	15	22	26	27	31	34
Total	1039	2058	2406	2559	2825	3147
Residential Peak Savings (MW)						
Building Standards	119	294	400	484	654	842
Appliance Standards	64	203	266	314	400	490
Utility and Public Agency Programs	32	116	152	191	188	184
Market and Price Effects	1515	1091	2046	2205	2436	2629
Total	1730	1704	2864	3194	3679	4145
Total Peak Savings	2769	3762	5270	5753	6504	7291

Source: California Energy Commission, 2007.

Form 1.1 - PG&E Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Electricity Consumption by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1980	21,424	16,527	17,852	955	6,188	3,281	515	66,741
1981	21,632	18,366	18,332	1,069	6,598	3,486	484	69,966
1982	21,116	18,465	15,924	2,933	5,385	3,744	465	68,031
1983	21,858	18,851	16,111	3,130	4,995	3,727	431	69,103
1984	22,883	19,682	16,772	3,393	6,524	4,161	416	73,832
1985	23,292	20,483	17,333	3,676	6,544	4,530	424	76,282
1986	23,180	20,743	17,490	3,106	5,509	3,943	422	74,394
1987	24,278	22,413	18,249	3,102	6,040	4,509	417	79,009
1988	25,041	23,493	19,158	3,174	6,393	4,446	431	82,137
1989	25,389	24,814	19,522	3,197	6,476	4,601	435	84,434
1990	25,844	26,022	20,071	3,188	6,512	4,685	481	86,803
1991	26,308	26,325	19,545	3,255	5,887	4,799	508	86,627
1992	26,412	27,333	19,500	3,190	6,078	4,871	499	87,883
1993	26,781	27,714	19,706	3,115	5,850	4,955	507	88,627
1994	27,013	27,850	19,784	2,838	5,772	4,854	509	88,621
1995	27,080	28,516	20,770	2,574	5,380	4,934	527	89,781
1996	28,120	29,466	20,486	2,629	5,723	5,104	542	92,069
1997	28,599	31,203	21,750	2,716	5,975	4,897	559	95,699
1998	29,596	31,156	21,117	2,563	5,000	4,841	572	94,845
1999	30,521	33,176	20,572	2,585	6,005	5,165	509	98,534
2000	31,646	34,503	20,748	2,599	6,004	5,279	552	101,331
2001	29,657	33,329	18,893	2,397	6,350	4,857	509	95,993
2002	30,537	34,220	18,143	2,283	6,439	4,944	503	97,070
2003	31,976	35,243	17,954	2,477	6,324	4,682	516	99,171
2004	32,708	35,741	18,352	2,642	6,778	4,987	532	101,740
2005	33,106	35,819	18,619	2,863	5,402	5,113	537	101,460
2006	34,345	36,943	18,561	2,912	6,010	5,407	542	104,719
2007	34,985	37,885	18,731	2,930	6,035	5,475	548	106,589
2008	35,569	38,395	18,940	2,895	6,048	5,529	553	107,929
2009	36,229	39,039	19,009	2,902	6,069	5,584	559	109,391
2010	36,889	39,666	19,071	2,919	6,097	5,639	565	110,846
2011	37,621	40,279	19,185	2,932	6,128	5,704	572	112,421
2012	38,349	40,889	19,270	2,941	6,151	5,771	579	113,951
2013	39,055	41,485	19,312	2,948	6,187	5,838	586	115,412
2014	39,764	42,074	19,321	2,957	6,207	5,907	594	116,824
2015	40,489	42,642	19,333	2,965	6,237	5,976	601	118,243
2016	41,222	43,191	19,338	2,970	6,267	6,047	609	119,644
2017	41,962	43,724	19,314	2,971	6,290	6,118	616	120,997
2018	42,720	44,248	19,267	2,971	6,315	6,191	624	122,336

Annual Growth Rates (%)

1980-1990	1.9	4.6	1.2	12.8	0.5	3.6	-0.7	2.7
1990-2000	2.0	2.9	0.3	-2.0	-0.8	1.2	1.4	1.6
2000-2006	1.4	1.1	-1.8	1.9	0.0	0.4	-0.3	0.5
2006-2011	1.8	1.7	0.7	0.1	0.4	1.1	1.1	1.4
2011-2018	1.8	1.4	0.1	0.2	0.4	1.2	1.3	1.2
2006-2018	1.8	1.5	0.3	0.2	0.4	1.1	1.2	1.3

Form 1.1b - PG&E Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Electricity Sales by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1980	21,424	16,527	17,178	955	6,188	3,281	515	66,067
1981	21,632	18,366	17,641	1,069	6,598	3,486	484	69,276
1982	21,116	18,456	15,162	2,911	5,385	3,744	465	67,238
1983	21,858	18,832	15,226	3,048	4,994	3,724	431	68,113
1984	22,883	19,662	15,987	3,301	6,524	4,146	416	72,918
1985	23,291	20,416	16,482	3,567	6,540	4,480	424	75,201
1986	23,178	20,652	16,342	2,707	5,502	3,840	422	72,643
1987	24,274	22,255	16,313	2,463	6,033	4,397	417	76,153
1988	25,036	23,163	16,829	2,411	6,385	4,329	431	78,584
1989	25,383	24,460	17,134	2,108	6,468	4,482	435	80,470
1990	25,837	25,638	17,638	2,015	6,504	4,556	481	82,670
1991	26,302	25,915	17,320	2,024	5,878	4,668	508	82,615
1992	26,406	26,919	17,276	1,978	6,069	4,741	499	83,887
1993	26,774	27,277	16,592	1,900	5,847	4,811	507	83,708
1994	27,013	27,408	16,536	1,634	5,770	4,730	509	83,601
1995	27,080	28,073	17,531	1,391	5,378	4,810	527	84,789
1996	28,120	29,020	16,752	1,412	5,720	4,979	542	86,545
1997	28,599	30,765	17,960	1,444	5,972	4,785	559	90,084
1998	29,596	30,721	17,699	1,278	4,997	4,728	572	89,592
1999	30,521	32,736	17,157	1,407	6,005	5,064	509	93,399
2000	31,646	34,065	17,594	1,408	6,004	5,179	552	96,448
2001	29,657	33,101	15,794	1,364	6,350	4,644	509	91,420
2002	30,537	33,810	14,778	1,197	6,439	4,908	503	92,173
2003	31,976	34,921	14,288	1,356	6,324	4,649	516	94,031
2004	32,708	35,439	15,204	1,483	6,778	4,960	532	97,105
2005	33,106	35,458	15,570	1,780	5,402	5,086	537	96,940
2006	34,345	36,472	15,519	2,007	6,010	5,269	542	100,164
2007	34,977	37,366	15,669	2,019	6,035	5,335	548	101,949
2008	35,553	37,828	15,854	1,978	6,048	5,388	553	103,202
2009	36,205	38,424	15,900	1,977	6,069	5,442	559	104,577
2010	36,857	39,003	15,939	1,988	6,097	5,496	565	105,945
2011	37,582	39,568	16,029	1,993	6,128	5,560	572	107,433
2012	38,302	40,130	16,092	1,996	6,151	5,626	579	108,876
2013	39,000	40,677	16,111	1,996	6,187	5,692	586	110,250
2014	39,701	41,219	16,097	1,998	6,207	5,759	594	111,575
2015	40,418	41,739	16,085	1,999	6,237	5,828	601	112,907
2016	41,144	42,239	16,068	1,997	6,267	5,898	609	114,221
2017	41,876	42,724	16,021	1,992	6,290	5,968	616	115,487
2018	42,626	43,200	15,950	1,984	6,315	6,040	624	116,739

Annual Growth Rates (%)

1980-1990	1.9	4.5	0.3	7.8	0.5	3.3	-0.7	2.3
1990-2000	2.0	2.9	0.0	-3.5	-0.8	1.3	1.4	1.6
2000-2006	1.4	1.1	-2.1	6.1	0.0	0.3	-0.3	0.6
2006-2011	1.8	1.6	0.6	-0.1	0.4	1.1	1.1	1.4
2011-2018	1.8	1.3	-0.1	-0.1	0.4	1.2	1.3	1.2
2006-2018	1.8	1.4	0.2	-0.1	0.4	1.1	1.2	1.3

Form 1.2 - PGE
California Energy Demand 2008-2018 Staff Revised Forecast
Net Energy for Load (GWh)

Year	Total Consumption	Net Losses	Gross Generation	Non-PV Self Generation	Incremental PV	Total Private Supply	Net Energy for Load
1980	66,741	6,342	73,084	674	0	0	73,084
1981	69,966	6,651	76,617	690	0	0	76,617
1982	68,031	6,455	74,486	793	0	0	74,486
1983	69,103	6,539	75,641	989	0	0	75,641
1984	73,832	7,000	80,832	914	0	0	80,832
1985	76,282	7,219	83,501	1,081	0	0	83,501
1986	74,394	6,974	81,368	1,751	0	0	81,368
1987	79,009	7,311	86,320	2,856	0	0	86,320
1988	82,137	7,544	89,681	3,553	0	0	89,681
1989	84,434	7,725	92,159	3,963	0	0	92,159
1990	86,803	7,936	94,739	4,133	0	4,133	90,606
1991	86,627	7,931	94,558	4,012	0	4,012	90,546
1992	87,883	8,053	95,936	3,996	0	3,996	91,940
1993	88,627	8,036	96,663	4,919	0	4,919	91,744
1994	88,621	8,026	96,647	5,020	0	5,020	91,626
1995	89,781	8,140	97,921	4,992	0	4,992	92,929
1996	92,069	8,308	100,378	5,525	0	5,525	94,853
1997	95,699	8,648	104,347	5,615	0	5,615	98,732
1998	94,845	8,601	103,446	5,253	0	5,253	98,192
1999	98,534	8,966	107,501	5,136	0	5,136	102,365
2000	101,331	9,259	110,590	4,883	0	4,883	105,707
2001	95,993	8,776	104,769	4,573	0	4,573	100,196
2002	97,070	8,849	105,919	4,897	0	4,897	101,022
2003	99,171	9,027	108,198	5,141	0	5,141	103,057
2004	101,740	9,322	111,063	4,635	0	4,635	106,427
2005	101,460	9,306	110,766	4,520	0	4,520	106,246
2006	104,719	9,616	114,335	4,556	0	4,556	109,779
2007	106,589	9,792	116,381	4,588	52	4,640	111,741
2008	107,929	9,917	117,846	4,622	105	4,727	113,119
2009	109,391	10,054	119,445	4,657	157	4,814	114,631
2010	110,846	10,191	121,036	4,691	209	4,901	116,135
2011	112,421	10,339	122,760	4,726	262	4,988	117,772
2012	113,951	10,482	124,433	4,761	314	5,075	119,358
2013	115,412	10,619	126,031	4,795	367	5,162	120,869
2014	116,824	10,751	127,575	4,830	419	5,249	122,326
2015	118,243	10,884	129,127	4,865	471	5,336	123,791
2016	119,644	11,015	130,659	4,899	524	5,423	125,236
2017	120,997	11,142	132,139	4,934	576	5,510	126,629
2018	122,336	11,267	133,603	4,968	628	5,597	128,006

Annual Growth Rates (%)

1980-1990	2.7	2.3	2.6	19.9			2.2
1990-2000	1.6	1.6	1.6	1.7		1.7	1.6
2000-2006	0.5	0.6	0.6	-1.2		-1.2	0.6
2006-2011	1.4	1.5	1.4	0.7		1.8	1.4
2011-2018	1.2	1.2	1.2	0.7	13.3	1.7	1.2
2006-2018	1.3	1.3	1.3	0.7		1.7	1.3

Form 1.3 - PG&E Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Coincident Peak Demand by Sector (MW)

Year	Residential	Commercial	Industrial	Agricultural	Other	Total Demand
1980	4,794	3,300	2,829	1,287	449	12,660
1981	4,645	3,522	2,842	1,347	463	12,820
1982	3,865	3,326	2,558	1,016	466	11,232
1983	4,711	3,736	2,786	776	501	12,510
1984	4,952	4,047	3,024	1,055	574	13,651
1985	5,608	3,967	2,642	1,255	568	14,040
1986	4,710	3,857	2,962	1,044	519	13,092
1987	4,783	4,047	2,970	1,108	572	13,480
1988	5,989	4,635	2,941	1,258	577	15,400
1989	5,405	5,038	2,982	1,016	597	15,037
1990	6,106	4,891	3,315	1,284	607	16,203
1991	5,984	4,904	2,855	1,185	598	15,526
1992	5,528	5,007	3,198	1,194	617	15,544
1993	6,235	5,258	3,221	1,084	633	16,431
1994	6,076	5,238	3,298	1,155	641	16,408
1995	6,416	5,518	3,539	1,047	672	17,192
1996	7,177	5,828	3,425	1,086	673	18,189
1997	6,988	6,135	3,655	1,139	650	18,567
1998	7,911	6,447	3,582	937	648	19,526
1999	8,142	6,475	3,003	1,121	658	19,399
2000	8,211	6,978	2,951	863	655	19,658
2001	7,394	6,466	2,838	1,219	639	18,554
2002	8,458	6,557	2,683	1,216	643	19,557
2003	8,247	7,061	2,640	907	595	19,450
2004	7,537	7,107	3,304	1,060	695	19,702
2005	8,721	6,915	2,906	1,039	676	20,257
2006	9,689	7,394	3,497	1,231	774	22,585
2007	9,570	7,107	3,270	1,144	726	21,818
2008	9,746	7,197	3,296	1,145	733	22,117
2009	9,933	7,307	3,305	1,148	741	22,433
2010	10,121	7,414	3,314	1,152	748	22,750
2011	10,332	7,520	3,331	1,157	756	23,096
2012	10,545	7,625	3,343	1,160	765	23,439
2013	10,759	7,728	3,348	1,166	774	23,776
2014	10,976	7,831	3,348	1,168	783	24,105
2015	11,197	7,931	3,347	1,172	792	24,439
2016	11,421	8,028	3,345	1,176	801	24,772
2017	11,648	8,122	3,339	1,179	811	25,098
2018	11,879	8,215	3,328	1,181	820	25,424

Annual Growth Rates (%)

1980-1990	2.4	4.0	1.6	0.0	3.1	2.5
1990-2000	3.0	3.6	-1.2	-3.9	0.8	2.0
2000-2006	2.8	1.0	2.9	6.1	2.8	2.3
2006-2011	1.3	0.3	-1.0	-1.2	-0.5	0.4
2011-2018	2.0	1.3	0.0	0.3	1.2	1.4
2006-2018	1.7	0.9	-0.4	-0.3	0.5	1.0

Form 1.4 - PG&E Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Peak Demand (MW)

Year	Total End Use Load	Net Losses	Gross Generation	Non-PV Self Generation	Incremental PV	Total Private Supply	Net Peak Demand	Load Factor (%)
1980	12,660	1,218	13,878	107	0	107	13,771	61
1981	12,820	1,233	14,053	109	0	109	13,943	62.8
1982	11,232	1,077	12,309	126	0	126	12,183	69.9
1983	12,510	1,198	13,708	157	0	157	13,551	63.8
1984	13,651	1,310	14,961	145	0	145	14,817	62.3
1985	14,040	1,345	15,386	171	0	171	15,214	62.7
1986	13,092	1,243	14,335	278	0	278	14,058	66.2
1987	13,480	1,264	14,744	453	0	453	14,291	69.2
1988	15,400	1,439	16,839	563	0	563	16,276	63.1
1989	15,037	1,398	16,434	628	0	628	15,806	66.8
1990	16,203	1,508	17,711	655	0	655	17,055	60.6
1991	15,526	1,444	16,971	636	0	636	16,335	63.3
1992	15,544	1,446	16,990	634	0	634	16,357	64.2
1993	16,431	1,518	17,949	780	0	780	17,169	61.0
1994	16,408	1,514	17,922	796	0	796	17,126	61.1
1995	17,192	1,591	18,783	791	0	791	17,991	59.0
1996	18,189	1,679	19,869	876	0	876	18,993	57.0
1997	18,567	1,715	20,282	890	0	890	19,392	58.1
1998	19,526	1,813	21,339	833	0	833	20,506	54.7
1999	19,399	1,803	21,202	814	0	814	20,387	57.3
2000	19,658	1,832	21,490	774	0	774	20,716	58.3
2001	18,554	1,729	20,284	725	0	725	19,559	58.5
2002	19,557	1,822	21,379	776	0	776	20,603	56.0
2003	19,450	1,808	21,257	815	0	815	20,442	57.6
2004	19,702	1,840	21,542	735	0	735	20,807	58.4
2005	20,257	1,895	22,152	717	0	717	21,435	56.6
2006	22,585	2,121	24,706	722	0	722	23,983	52.3
2007	21,818	2,046	23,864	728	23	750	23,114	55.2
2008	22,117	2,074	24,191	733	45	778	23,413	55.2
2009	22,433	2,104	24,538	739	68	806	23,731	55.1
2010	22,750	2,135	24,885	744	90	834	24,050	55.1
2011	23,096	2,168	25,264	750	113	863	24,401	55.1
2012	23,439	2,200	25,639	756	135	891	24,748	55.1
2013	23,776	2,232	26,008	761	158	919	25,089	55.0
2014	24,105	2,264	26,369	767	180	947	25,422	54.9
2015	24,439	2,296	26,735	773	203	975	25,760	54.9
2016	24,772	2,327	27,100	778	225	1,003	26,096	54.8
2017	25,098	2,359	27,457	784	248	1,031	26,425	54.7
2018	25,424	2,390	27,814	789	270	1,060	26,754	54.6

Annual Growth Rates (%)

1980-1990	2.5	2.2	2.5	19.9		19.9	2.2	0.0
1990-2000	2.0	2.0	2.0	1.7		1.7	2.0	-0.4
2000-2006	2.3	2.5	2.4	-1.2		-1.2	2.5	-1.8
2006-2011	0.4	0.4	0.4	0.8		3.6	0.3	1.1
2011-2018	1.4	1.4	1.4	0.7	13.3	3.0	1.3	-0.1
2006-2018	1.0	1.0	1.0	0.7		3.2	0.9	0.4

Form 1.7a - PG&E Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Private Supply by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1990	7	383	2,433	1,173	8	129	0	4,133
1991	7	410	2,225	1,231	9	131	0	4,012
1992	6	414	2,225	1,212	10	131	0	3,996
1993	7	437	3,113	1,215	3	144	0	4,919
1994	0	442	3,248	1,203	3	124	0	5,020
1995	0	443	3,239	1,183	3	124	0	4,992
1996	0	446	3,734	1,217	3	125	0	5,525
1997	0	438	3,790	1,272	3	112	0	5,615
1998	0	435	3,418	1,285	3	113	0	5,253
1999	0	440	3,416	1,178	0	101	0	5,136
2000	0	439	3,154	1,191	0	100	0	4,883
2001	0	228	3,100	1,032	0	213	0	4,573
2002	0	410	3,365	1,086	0	36	0	4,897
2003	0	322	3,666	1,120	0	33	0	5,141
2004	0	302	3,148	1,159	0	26	0	4,635
2005	0	362	3,049	1,083	0	26	0	4,520
2006	0	471	3,042	905	0	139	0	4,556
2007	8	519	3,063	911	0	140	0	4,640
2008	16	567	3,086	918	0	141	0	4,727
2009	24	615	3,109	925	0	142	0	4,814
2010	31	663	3,132	931	0	143	0	4,901
2011	39	711	3,155	938	0	144	0	4,988
2012	47	759	3,178	945	0	145	0	5,075
2013	55	807	3,201	952	0	146	0	5,162
2014	63	856	3,225	959	0	147	0	5,249
2015	71	904	3,248	966	0	148	0	5,336
2016	79	952	3,271	973	0	149	0	5,423
2017	86	1,000	3,294	980	0	150	0	5,510
2018	94	1,048	3,317	986	0	151	0	5,597

Annual Growth Rates (%)

1990-2000		1.4	2.6	0.2		-2.5	1.7
2000-2006		1.2	-0.6	-4.5		5.6	-1.2
2006-2011		8.6	0.7	0.7		0.7	1.8
2011-2018	13.3	5.7	0.7	0.7		0.7	1.7
2006-2018		6.9	0.7	0.7		0.7	1.7

**Form 1.9a - PG&E Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Peak Demand and Sales Forecast by LSE**

Peak Demand Coincident with Planning Area Peak (MW)

	2,006	2,007	2,008	2,009	2,010	2,011	2,012	2,013	2,014	2,015	2,016	2,017	2,018
PG&E Service Area by Climate Zone:													
Zone 1 (North Coast and Mountain)	847	774	782	794	805	817	830	841	853	864	876	887	898
Zone 2 (Sacramento Region)	2,211	2,141	2,187	2,244	2,298	2,357	2,420	2,480	2,542	2,605	2,668	2,732	2,798
Zone 3 (Valley Region)	6,833	6,418	6,513	6,590	6,671	6,758	6,846	6,934	7,019	7,107	7,194	7,282	7,368
Zone 4 (East Bay Region)	6,964	6,989	7,067	7,161	7,256	7,363	7,467	7,571	7,671	7,772	7,873	7,967	8,064
Zone 5 (San Francisco Region)	3,710	3,523	3,546	3,574	3,603	3,632	3,659	3,684	3,707	3,731	3,752	3,772	3,791
PG&E Service Area Total	20,565	19,845	20,096	20,364	20,632	20,928	21,222	21,511	21,793	22,078	22,363	22,641	22,919
Direct Access	1,071	1,017	967	967	967	967	967	967	967	967	967	967	967
PG&E Bundled	19,494	18,827	19,129	19,397	19,666	19,961	20,255	20,544	20,826	21,112	21,397	21,674	21,952
NCPA	518	510	517	524	531	538	545	552	559	566	573	580	586
Silicon Valley Power	485	474	480	486	491	498	504	509	515	520	525	530	534
CCSF	124	118	118	119	120	120	121	121	122	122	122	123	123
Other LSEs	93	85	86	87	87	88	89	89	90	91	91	92	93
Modesto Irrigation District	738	698	710	722	734	747	760	773	786	799	813	826	839
Turlock Irrigation District	503	474	482	490	498	506	515	524	533	541	550	559	568
Merced	84	80	81	82	83	85	86	87	88	89	91	92	93
WAPA	240	220	220	220	219	219	219	219	218	218	218	218	217
Redding	260	248	252	258	265	273	279	285	290	296	302	308	314
Roseville	338	330	338	346	355	364	374	383	392	402	411	421	431
Shasta PUD	36	33	34	34	34	35	35	35	36	36	36	36	37
Planning Area Total	23,983	23,114	23,413	23,731	24,050	24,401	24,748	25,089	25,422	25,760	26,096	26,425	26,754

Electricity Sales (gWh) by LSE

	2,006	2,007	2,008	2,009	2,010	2,011	2,012	2,013	2,014	2,015	2,016	2,017	2,018
PG&E Service Area by Climate Zone:													
Zone 1 (North Coast and Mountain)	4,391	4,414	4,458	4,513	4,567	4,626	4,685	4,740	4,795	4,849	4,904	4,958	5,011
Zone 2 (Sacramento Region)	7,370	7,580	7,759	7,972	8,184	8,408	8,636	8,863	9,090	9,320	9,550	9,777	10,006
Zone 3 (Valley Region)	21,259	21,720	22,025	22,302	22,582	22,890	23,194	23,489	23,773	24,064	24,351	24,630	24,909
Zone 4 (East Bay Region)	29,237	29,787	30,135	30,546	30,951	31,401	31,838	32,250	32,647	33,044	33,432	33,802	34,161
Zone 5 (San Francisco Region)	21,950	22,242	22,418	22,629	22,834	23,046	23,249	23,431	23,596	23,758	23,916	24,064	24,210
PG&E Service Area Total	84,208	85,743	86,795	87,963	89,117	90,372	91,602	92,773	93,900	95,034	96,153	97,231	98,297
Direct Access	7,245	6,883	6,814	6,814	6,814	6,814	6,814	6,814	6,814	6,814	6,814	6,814	6,814
PG&E Bundled	76,963	78,860	79,981	81,149	82,303	83,558	84,788	85,959	87,086	88,220	89,339	90,417	91,483
NCPA	2,360	2,408	2,440	2,470	2,500	2,531	2,562	2,590	2,618	2,645	2,671	2,697	2,721
Silicon Valley Power	2,619	2,664	2,699	2,730	2,761	2,795	2,828	2,857	2,884	2,911	2,937	2,961	2,983
CCSF	1,268	1,256	1,261	1,268	1,275	1,280	1,286	1,292	1,297	1,301	1,306	1,309	1,313
Other LSEs	463	465	467	471	474	478	482	486	489	493	496	499	503
Modesto Irrigation District	2,562	2,624	2,668	2,710	2,752	2,798	2,844	2,888	2,930	2,973	3,016	3,058	3,099
Turlock Irrigation District	1,891	1,928	1,958	1,987	2,016	2,048	2,080	2,112	2,142	2,173	2,204	2,235	2,265
Merced	374	382	388	392	397	403	408	413	417	422	426	430	434
WAPA	2,196	2,196	2,196	2,196	2,196	2,196	2,196	2,196	2,196	2,196	2,196	2,196	2,196
Redding	815	836	852	874	905	940	959	978	997	1,016	1,035	1,054	1,074
Roseville	1,222	1,258	1,288	1,324	1,359	1,395	1,432	1,469	1,506	1,543	1,579	1,616	1,652
Shasta PUD	185	188	191	192	194	195	197	198	199	200	201	202	202
Planning Area Total	100,164	101,949	103,202	104,577	105,945	107,433	108,876	110,250	111,575	112,907	114,221	115,487	116,739

Service Area loads include customer served by "direct access" electricity service providers.
2006 sales are actual; 2006 loads are actual or estimated coincident peak.

**Form 1.9b - PG&E Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Peak Demand and Consumption Forecast by Climate Zone**

Total Consumption (GWH)

Peak Demand Coincident with Planning Area Peak (MW)

Year	Zone 1 (North Coast and Mountain)	Zone 2 (Sacramento Region)	Zone 3 (Valley Region)	Zone 4 (East Bay Region)	Zone 5 (San Francisco Region)	Zone 1 (North Coast and Mountain)	Zone 2 (Sacramento Region)	Zone 3 (Valley Region)	Zone 4 (East Bay Region)	Zone 5 (San Francisco Region)
1990	641	1,800	6,591	5,043	3,080	4,276	6,301	23,155	31,525	21,546
1991	612	1,758	6,022	5,092	2,956	4,351	6,140	23,633	31,218	21,286
1992	665	1,648	6,014	5,098	3,015	4,283	6,254	24,377	31,460	21,509
1993	813	1,837	6,356	5,173	3,216	4,365	6,835	23,684	31,903	21,840
1994	851	1,699	6,418	5,234	3,153	4,367	7,307	23,632	31,584	21,731
1995	702	1,904	6,718	5,604	3,272	4,334	7,764	23,253	32,155	22,275
1996	672	2,102	7,357	5,810	3,336	4,316	7,910	24,225	32,975	22,643
1997	735	2,218	7,238	6,025	3,470	4,375	8,222	25,102	34,510	23,490
1998	707	2,116	7,287	6,943	3,608	4,577	8,300	24,363	34,747	22,858
1999	693	2,160	7,890	6,297	3,510	4,880	8,864	25,045	35,819	23,925
2000	922	2,223	7,476	6,562	3,643	4,923	9,179	26,021	36,764	24,444
2001	649	2,057	7,274	6,195	3,467	4,450	7,858	26,877	33,924	22,883
2002	677	2,360	7,765	6,570	3,382	4,624	9,439	26,162	33,870	22,976
2003	652	2,178	7,060	6,878	3,806	4,577	9,603	26,320	35,300	23,372
2004	748	2,281	7,499	6,525	3,811	4,725	9,829	28,362	35,189	23,635
2005	822	2,537	8,283	6,176	3,689	4,977	9,883	27,645	35,194	23,761
2006	978	2,771	8,703	7,704	3,826	5,338	9,181	30,584	35,652	23,965
2007	895	2,681	8,177	7,721	3,639	5,331	9,440	31,218	36,302	24,297
2008	904	2,738	8,298	7,809	3,664	5,382	9,663	31,651	36,732	24,501
2009	918	2,807	8,403	7,910	3,693	5,442	9,920	32,116	37,193	24,720
2010	930	2,872	8,512	8,013	3,723	5,499	10,174	32,590	37,649	24,935
2011	944	2,944	8,631	8,129	3,753	5,563	10,443	33,105	38,155	25,155
2012	958	3,020	8,749	8,241	3,781	5,624	10,715	33,612	38,637	25,362
2013	970	3,094	8,866	8,352	3,807	5,680	10,985	34,110	39,089	25,548
2014	983	3,169	8,980	8,460	3,831	5,737	11,254	34,596	39,520	25,716
2015	996	3,244	9,097	8,567	3,855	5,793	11,527	35,094	39,950	25,879
2016	1,009	3,321	9,214	8,676	3,877	5,849	11,798	35,588	40,370	26,038
2017	1,021	3,399	9,332	8,776	3,897	5,905	12,067	36,074	40,766	26,185
2018	1,033	3,477	9,447	8,879	3,918	5,959	12,337	36,562	41,147	26,331

Annual Growth Rates (%)

1990-2000	3.7	2.1	1.3	2.7	1.7	1.4	3.8	1.2	1.5	1.3
2000-2006	1.0	3.7	2.6	2.7	0.8	1.4	0.0	2.7	-0.5	-0.3
2006-2011	-0.7	1.2	-0.2	1.1	-0.4	0.8	2.6	1.6	1.4	1.0
2011-2018	1.3	2.4	1.3	1.3	0.6	1.0	2.4	1.4	1.1	0.7
2006-2018	0.5	1.9	0.7	1.2	0.2	0.9	2.5	1.5	1.2	0.8

Form 2.2 - PG&E Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Planning Area Economic and Demographic Assumptions

Year	Population	Households	Persons per Household	Real Personal Income (Millions 1977\$)	Industrial Value Added (Millions 2005\$)	Commercial Floorspace (MM Sqft.)
1980	8,584,529	3,270,576	2.62	3,270,576	12,902	1,328
1981	8,680,391	3,306,645	2.63	3,306,645	13,204	1,363
1982	8,795,963	3,338,700	2.63	3,338,700	12,795	1,395
1983	9,047,698	3,400,158	2.66	3,400,158	12,953	1,425
1984	9,283,230	3,469,059	2.68	3,469,059	13,620	1,458
1985	9,511,283	3,551,748	2.68	3,551,748	13,994	1,506
1986	9,718,571	3,635,161	2.67	3,635,161	14,184	1,561
1987	9,876,855	3,706,217	2.66	3,706,217	14,790	1,618
1988	10,047,184	3,774,571	2.66	3,774,571	15,557	1,667
1989	10,273,788	3,848,713	2.67	3,848,713	16,123	1,715
1990	10,450,128	3,897,421	2.68	3,897,421	20,071	1,759
1991	10,678,197	3,961,902	2.70	3,961,902	19,545	1,798
1992	10,874,483	4,011,740	2.71	4,011,740	19,500	1,827
1993	11,037,375	4,055,134	2.72	4,055,134	19,706	1,856
1994	11,125,194	4,095,706	2.72	4,095,706	19,784	1,880
1995	11,221,517	4,135,477	2.71	4,135,477	20,770	1,907
1996	11,331,199	4,173,736	2.71	4,173,736	20,486	1,930
1997	11,538,191	4,216,615	2.74	4,216,615	21,750	1,955
1998	11,684,836	4,265,384	2.74	4,265,384	21,117	1,984
1999	11,859,729	4,319,650	2.75	4,319,650	20,572	2,031
2000	12,059,436	4,359,928	2.77	4,359,928	20,748	2,075
2001	12,300,242	4,419,461	2.78	4,419,461	18,893	2,119
2002	12,482,264	4,477,544	2.79	4,477,544	18,143	2,171
2003	12,648,339	4,537,430	2.79	4,537,430	17,954	2,212
2004	12,809,984	4,604,004	2.78	4,604,004	18,352	2,244
2005	12,967,725	4,685,913	2.77	4,685,913	18,619	2,277
2006	13,136,741	4,745,796	2.77	4,745,796	18,561	2,312
2007	13,290,078	4,795,159	2.77	4,795,159	18,735	2,350
2008	13,446,021	4,845,310	2.78	4,845,310	18,954	2,390
2009	13,604,600	4,896,259	2.78	4,896,259	19,037	2,429
2010	13,765,455	4,947,869	2.78	4,947,869	19,112	2,466
2011	13,952,896	5,008,888	2.79	5,008,888	19,226	2,505
2012	14,143,684	5,070,938	2.79	5,070,938	19,311	2,545
2013	14,337,870	5,134,025	2.79	5,134,025	19,351	2,586
2014	14,535,530	5,198,178	2.80	5,198,178	19,358	2,628
2015	14,736,744	5,263,413	2.80	5,263,413	19,367	2,669
2016	14,941,581	5,329,756	2.80	5,329,756	19,369	2,710
2017	15,150,125	5,397,230	2.81	5,397,230	19,343	2,752
2018	15,362,434	5,465,852	2.81	5,465,852	19,292	2,794

Annual Growth Rates (%)

1980-1990	2.0	1.8	0.2	1.8	4.5	2.9
1990-2000	1.4	1.1	0.3	1.1	0.3	1.7
2000-2006	1.4	1.4	0.0	1.4	-1.8	1.8
2006-2011	1.2	1.1	0.1	1.1	0.7	1.6
2011-2018	1.4	1.3	0.1	1.3	0.0	1.6
2006-2018	1.3	1.2	0.1	1.2	0.3	1.6

CHAPTER 3: SOUTHERN CALIFORNIA EDISON PLANNING AREA

The Southern California Edison (SCE) planning area includes (1) SCE bundled retail customers, (2) customers served by energy service providers (ESPs) using the SCE distribution system to deliver electricity to end users, and (3) customers of the various Southern California municipal and irrigation district utilities with the exception of the cities of Los Angeles, Pasadena, Glendale, and Burbank and the Imperial Irrigation District.

This chapter is organized as follows. It first presents forecasted consumption and peak loads for the SCE planning area, including both total and per capita values. It compares the revised 2008 forecast to both the draft 2008 and *CED 2006* forecasts and explains differences between the forecasts. It also discusses the forecasted load factor, jointly determined by the consumption and peak load estimates. Next, the chapter presents the forecasts for the four climate zones which make up the SCE planning area. It then makes sector consumption and peak load forecasts comparisons for the residential, commercial, industrial, and “other” sector forecasts. Last, the chapter presents estimates of conservation savings embedded in the revised forecast by sector and broad program category.

Forecast Results

Table 15 compares the revised 2008 electricity consumption forecast with the draft 2008 and *CED 2006* forecasts. The revised 2008 forecast is higher than both of the previous forecasts over the forecast period. By the end of the forecast period the revised 2008 forecast is about 2.5 percent higher than the draft forecast and 4.5 percent higher than the *CED 2006* forecast. The increase in the revised forecast results from incorporation of the new Department of Finance (DOF) long-term population projections. DOF raised its projection of population in the SCE planning area, particularly in the hotter Inland Empire region of the area.

Table 16 presents a similar comparison for the peak demand forecasts. The increase in peak demand of the revised 2008 forecast is driven by the underlying changes in the energy consumption forecasts. The increase in the 2008–2016 growth rate of the revised 2008 forecast compared with the previous two forecasts is primarily driven by the revised DOF population forecast used in the revised 2008 forecast.

Table 15: SCE Planning Area Energy Forecast Comparison

Consumption (GWH)					
	CED 2006	Staff Draft	Staff Revised	Percent Difference Staff Revised/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	81,579	82,069	82,069	0.60%	0.00%
2000	98,346	99,148	99,146	0.81%	0.00%
2005	99,531	99,136	99,261	-0.27%	0.13%
2008	103,437	105,106	105,054	1.56%	-0.05%
2013	109,931	112,064	113,815	3.53%	1.56%
2016	113,409	115,627	118,497	4.49%	2.48%
Average Annual Growth Rates					
1990-2000	1.89%	1.91%	1.91%		
2000-2005	0.24%	0.00%	0.02%		
2005-2008	1.29%	1.97%	1.91%		
2008-2016	1.16%	1.20%	1.52%		
Historic values are shaded					

Source: California Energy Commission, 2007.

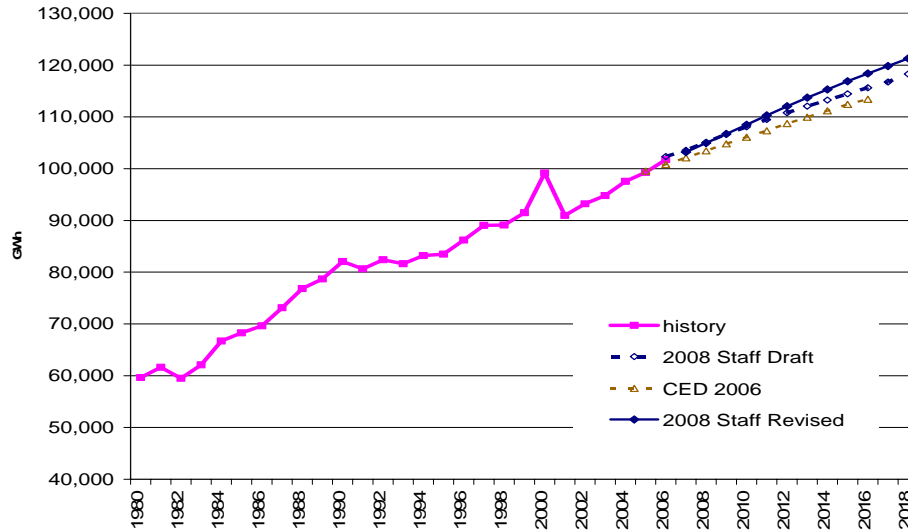
Table 16: SCE Planning Area Peak Forecast Comparison

Peak (MW)					
	CED 2006	Staff Draft	Staff Revised	Percent Difference Staff Revised/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	17,564	17,635	17,635	0.41%	0.00%
2000	19,465	19,408	19,408	-0.29%	0.00%
2005	21,510	21,956	21,956	2.07%	0.00%
2008	22,483	23,142	23,272	3.51%	0.56%
2013	24,059	24,674	25,258	4.98%	2.37%
2016	24,934	25,513	26,382	5.81%	3.40%
Average Annual Growth Rates					
1990-2000	1.03%	0.96%	0.96%		
2000-2005	2.02%	2.50%	2.50%		
2005-2008	1.49%	1.77%	1.96%		
2008-2016	1.30%	1.23%	1.58%		
Historic values are shaded					

Source: California Energy Commission, 2007.

As shown in **Figure 44**, the revised 2008 electricity consumption forecast starts at a point similar to the draft 2008 forecast. The revised 2008 forecast, however, grows at a faster rate over the forecast period than the draft 2008 forecast.

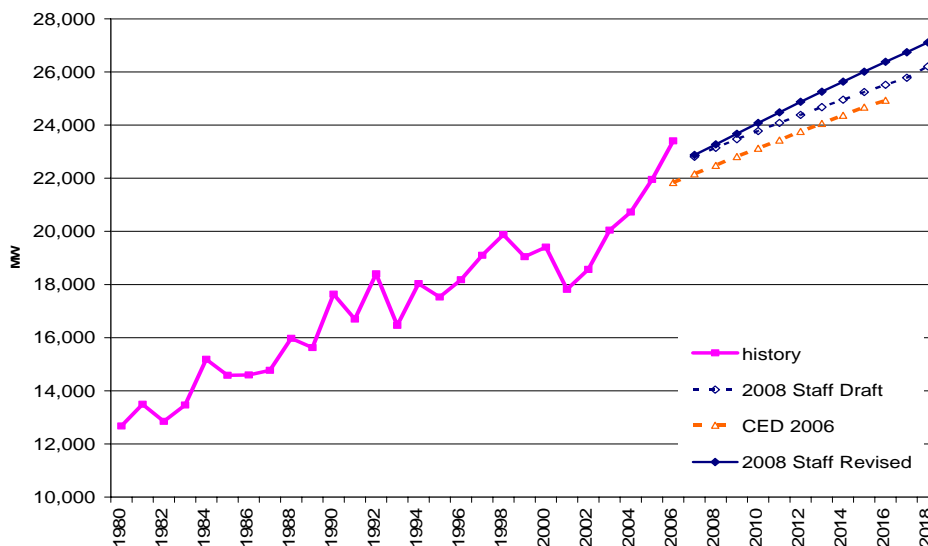
Figure 44: SCE Planning Area Electricity Forecast



Source: California Energy Commission, 2007.

The revised 2008 SCE planning area peak demand forecast, shown in **Figure 45**, also grows at a faster rate than the draft 2008 forecast due to the underlying electricity consumption forecast differences. The 2007 value of the revised 2008 forecast is projected based on normal weather. Load data to enable staff to develop a weather-adjusted 2007 peak value for the SCE planning area was not available at the time of the forecast. The temperatures in the SCE planning area on the 2007 summer peak day were substantially above normal, or “1-in-2” conditions, as were the temperatures in 2006, so the actual 2007 peak will be higher than what is estimated using normal weather.

Figure 45: SCE Planning Area Peak Demand Forecast

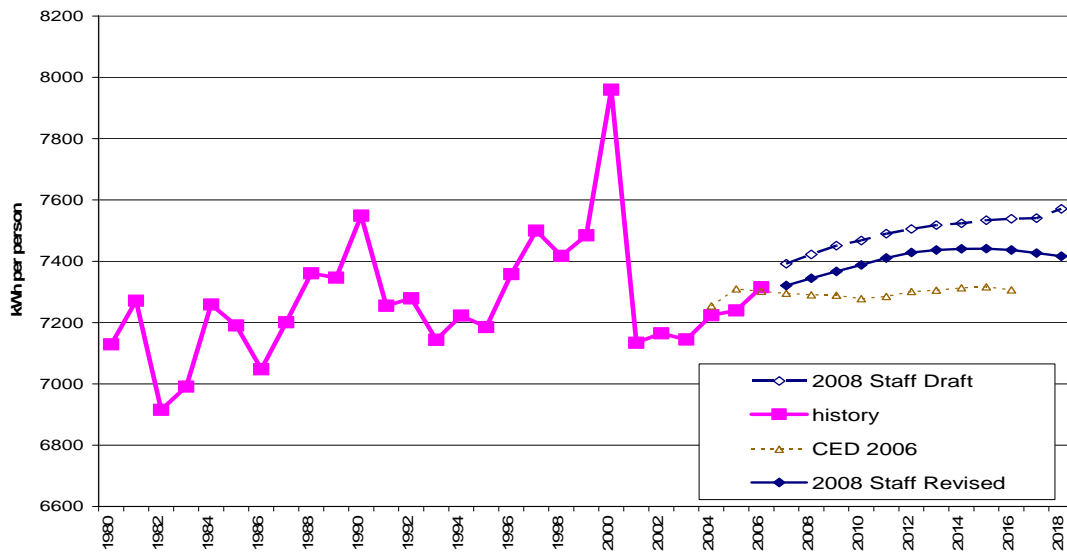


Source: California Energy Commission, 2007.

As **Figure 46** shows, projections of per capita electricity consumption in the revised 2008 forecast are lower than in the draft 2008 forecast, but higher than the *CED 2006* forecast. This is in part because of inclusion of 2006 historic consumption data and the revised population forecast. The 2006 historic consumption data was lower than what was estimated in the draft 2008 forecast, and the revised population forecast is higher than what was used in the draft 2008 forecast. This yields a lower per capita consumption starting value and a somewhat lower forecast than was presented in the draft 2008 forecast. The decline of per capita consumption seen in the latter part of the revised 2008 forecast period is caused by declines in the growth rates of commercial and industrial sector consumption in the latter part of the forecast period, reflecting assumed savings from conservation programs and building and appliance standards effects, as well as a change in composition of industrial use. Per capita consumption in the revised 2008 forecast does not return to the pre-energy crisis levels until 2010 and remains well below the 2000 value throughout the forecast period.

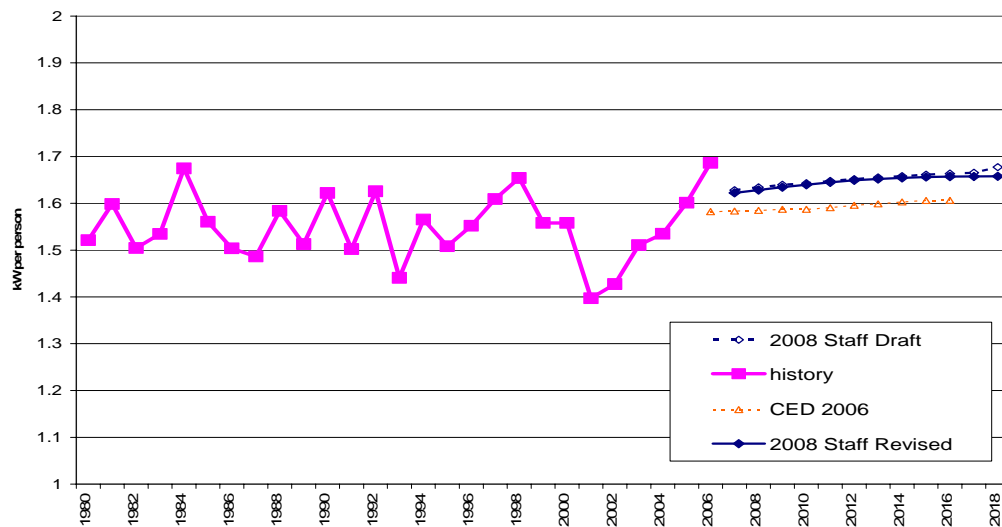
Figure 47 provides a comparison of per capita peak demand. The revised 2008 forecast of peak per capita is similar to the draft 2008 forecast. This is caused by increased electricity consumption forecasts in both the residential and commercial sectors, which are more sensitive to peak demand.

Figure 46: SCE Planning Area per Capita Electricity Consumption



Source: California Energy Commission, 2007.

Figure 47: SCE Planning Area per Capita Peak Demand

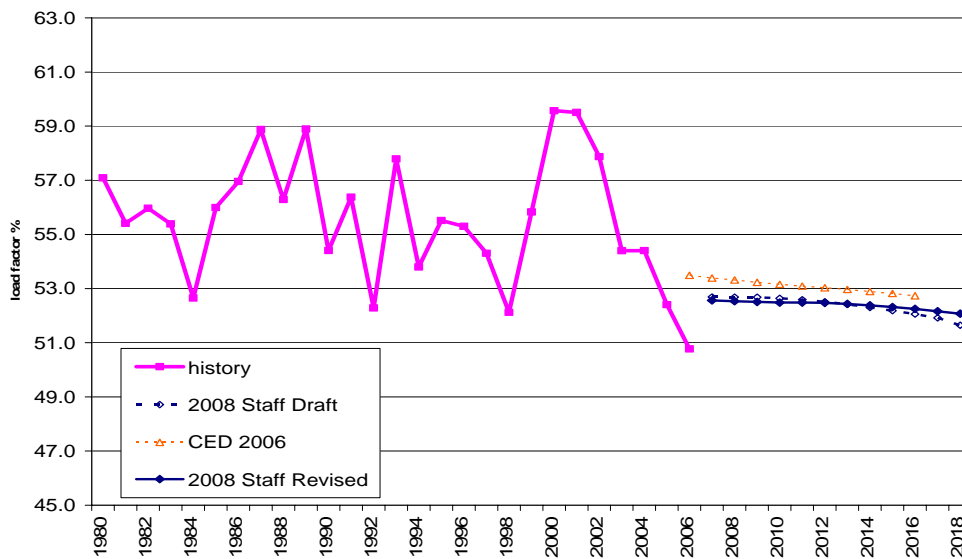


Source: California Energy Commission, 2007.

Figure 48 compares load factors of the revised 2008 forecast with the two previous forecasts. The load factor is a measure of the relative increase in peak demand with respect to annual electricity consumption. Lower load factors indicate a sharper needle peak, and higher load factors indicate a more stable load. The revised 2008 projected load factors are on the low end of the range of recent values and projected to decline slightly over the forecast period.

Over the forecast period, the draft 2008 load factor declines slightly, which is consistent with higher weather-sensitive load growth in relation to baseload energy growth. Consumption in the SCE planning area is shifting toward residential and commercial sectors and away from the industrial sectors. Growth is also increasingly taking place in hotter inland areas leading to greater saturation of central air conditioning and greater use of air conditioning equipment compared to earlier concentrations in cooler coastal areas. Additionally, air conditioning loads are increasing along the coast as more households install air conditioning units for the few days they may be needed each year. This usage pattern adds to peak demand, but adds very little to annual electricity consumption.

Figure 48: SCE Planning Area Load Factor



Source: California Energy Commission, 2007.

Forecast Results by Climate Zone

In the staff forecasting models, the SCE planning area is composed of four distinct climate zones: Zone 7 (southern San Joaquin Valley); Zone 8 (coastal part of Los Angeles Basin served by SCE); Zone 9 (inland part of the Los Angeles Basin served by SCE); and Zone 10 (Inland Empire). **Tables 17 and 18** present the electricity consumption and peak forecast by climate zones. The highest growth is projected to occur in both the Inland Empire (Zone 10) and southern San Joaquin (Zone 7) regions of the SCE planning area.

Table 17: SCE Planning Area Electricity Consumption by Climate Zone

Consumption (GWH)				
	Zone 7 Southern San Joaquin	Zone 8 Coastal LA Basin	Zone 9 Inland LA Basin	Zone 10 Inland Empire
1990	4,055	42,957	17,979	17,079
2000	4,491	50,635	20,414	23,605
2005	5,589	48,621	19,119	25,932
2008	6,215	50,183	19,519	29,138
2013	6,879	52,935	20,747	33,254
2016	7,261	54,255	21,398	35,582
Average Annual Growth Rates				
1990-2000	1.03%	1.66%	1.28%	3.29%
2000-2005	4.47%	-0.81%	-1.30%	1.90%
2005-2008	3.60%	1.06%	0.69%	3.96%
2008-2016	1.96%	0.98%	1.16%	2.53%
Historic values are shaded				

Source: California Energy Commission, 2007.

Table 18: SCE Planning Area Peak Demand by Climate Zone

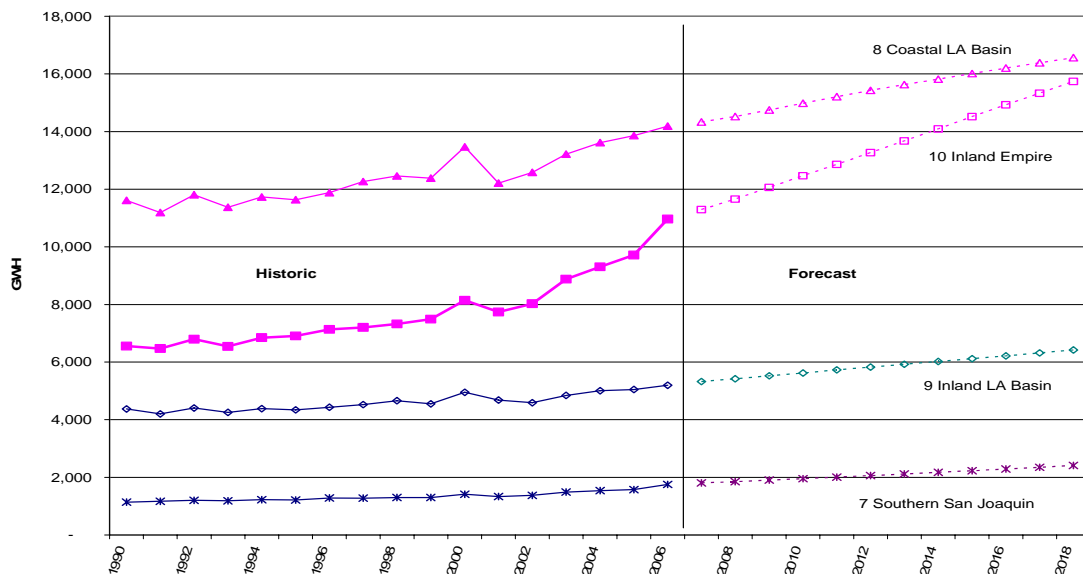
Peak (MW)				
	Zone 7 Southern San Joaquin	Zone 8 Coastal LA Basin	Zone 9 Inland LA Basin	Zone 10 Inland Empire
1990	809	8,530	3,973	4,668
2000	904	8,723	3,865	6,163
2005	1,526	9,421	4,174	6,975
2008	1,264	9,461	4,290	8,257
2013	1,404	9,993	4,589	9,272
2016	1,486	10,261	4,754	9,881
Average Annual Growth Rates				
1990-2000	1.12%	0.22%	-0.27%	2.82%
2000-2005	11.03%	1.55%	1.55%	2.51%
2005-2008	-6.08%	0.14%	0.92%	5.78%
2008-2016	2.04%	1.02%	1.29%	2.27%
Historic estimates are shaded				

Source: California Energy Commission, 2007.

Figure 49 presents electricity forecasts by climate zone for the SCE planning area. The fastest growing region is the Inland Empire (Zone 10). The inland and coastal parts of the Los Angeles Basin are projected to grow at about one half the rate of the Inland Empire. **Figure 50** presents the peak forecast estimates by climate zone. Staff does not have reliable estimates of historic loads that translate well to climate zones, thus the historic peak estimates are developed from the staff model based on electricity consumption and calibrated to individual

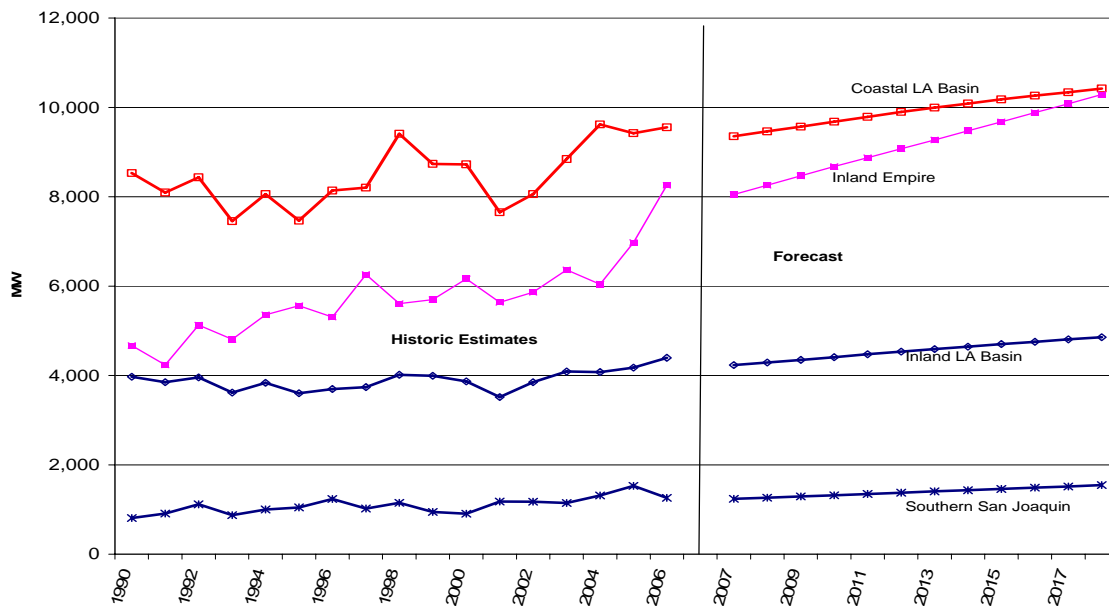
LSE peak load data, where available. More geographically disaggregate load data are needed to make more accurate peak estimates by climate zone.

Figure 49: SCE Planning Area Electricity Forecast by Climate Zone



Source: California Energy Commission, 2007.

Figure 50: SCE Planning Area Peak Forecast by Climate Zone



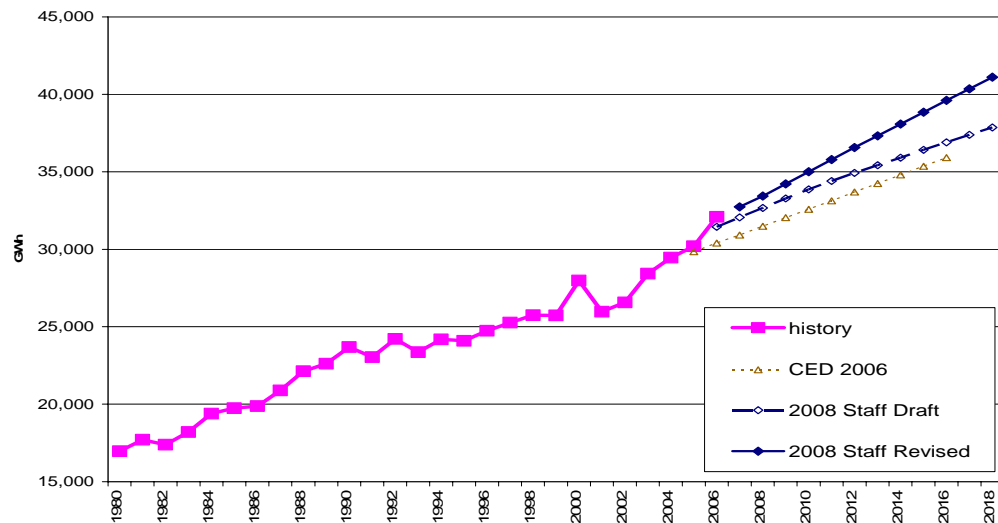
Source: California Energy Commission, 2007.

Sector Level Results and Input Assumptions

Residential

Figure 51 provides a comparison of the revised 2008 forecast of electricity consumption with previous SCE planning area residential forecasts. The revised 2008 forecast is higher throughout the entire forecast period. This is caused both by inclusion of actual 2006 consumption data in the historic period and use of the new Department of Finance long-term population projections. The inclusion of 2006 historic consumption raises the starting point of the forecast slightly, and the new population forecast increases the overall forecasted growth rate due to increases in population in the Inland Empire, in particular.

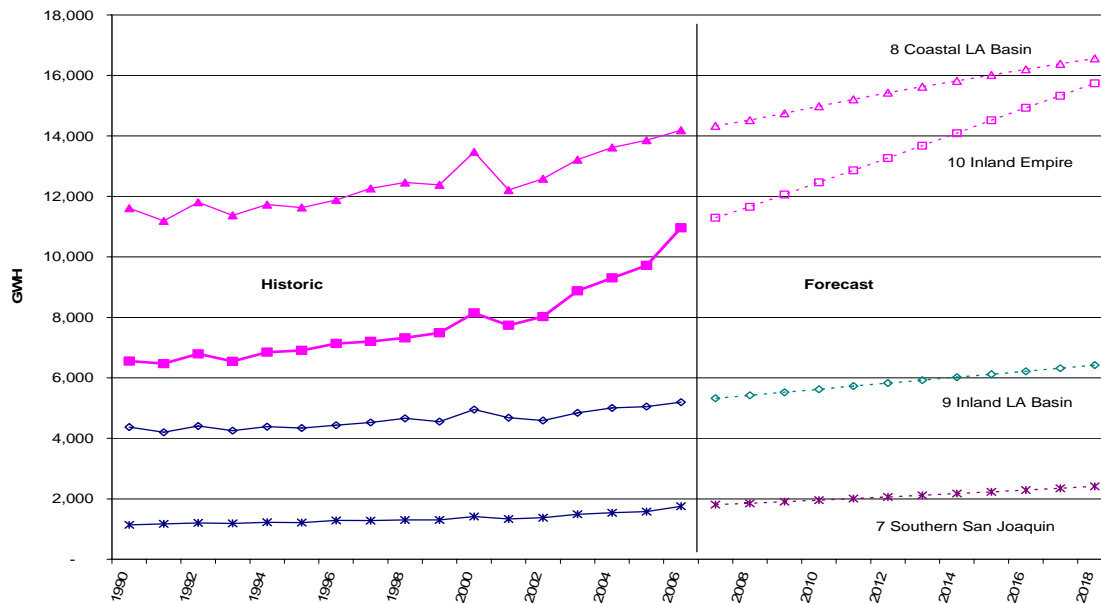
Figure 51: SCE Planning Area Residential Consumption



Source: California Energy Commission, 2007.

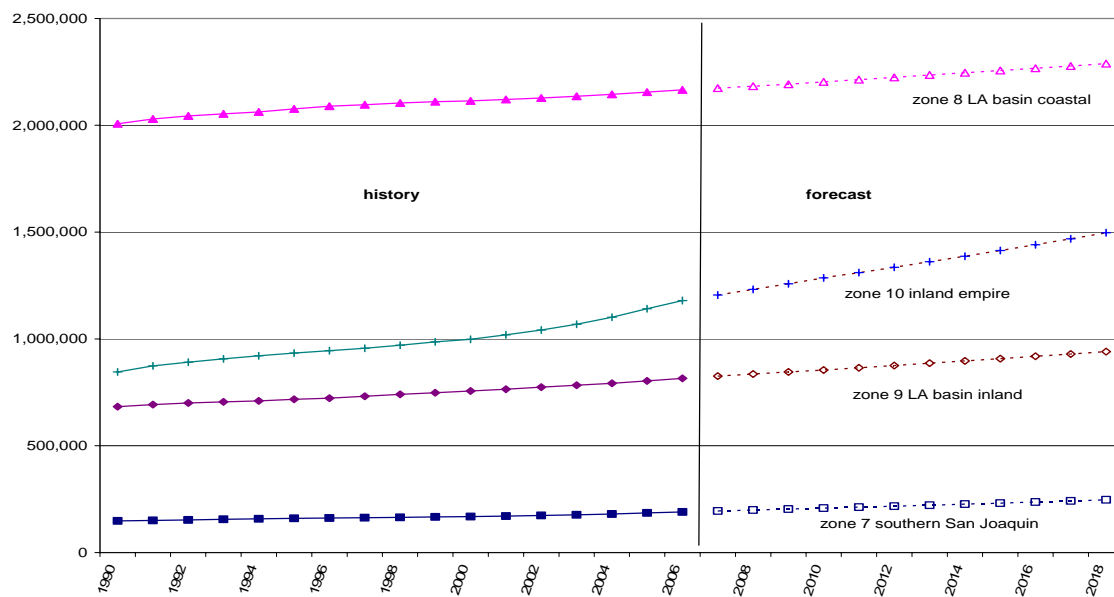
Figure 52 presents the revised 2008 residential forecast by climate zone. The large projected growth in the Inland Empire is driven by increased population forecasts for that region. This can be seen in **Figure 53**, which presents the revised 2008 household forecast by climate zone.

Figure 52: SCE Planning Area Residential Electricity Forecast by Climate Zone



Source: California Energy Commission, 2007.

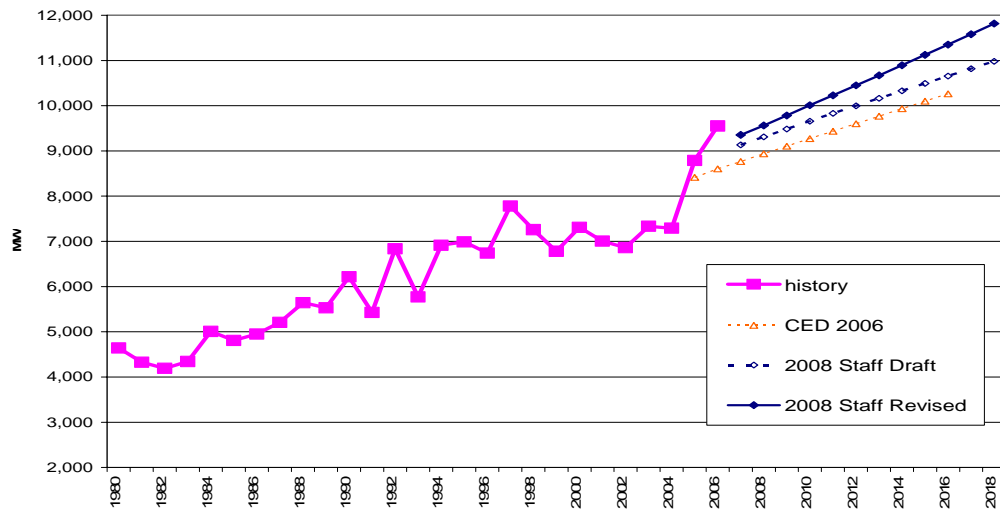
Figure 53: SCE Planning Area Household Forecast by Climate Zone



Source: California Energy Commission, 2007.

Figure 54 provides a comparison of the revised 2008 residential peak demand forecasts with the previous forecasts. As is the case for residential consumption, the revised 2008 residential peak forecast is higher than both previous forecasts. The difference between the two peak forecasts is similar to the difference in the electricity consumption forecasts.

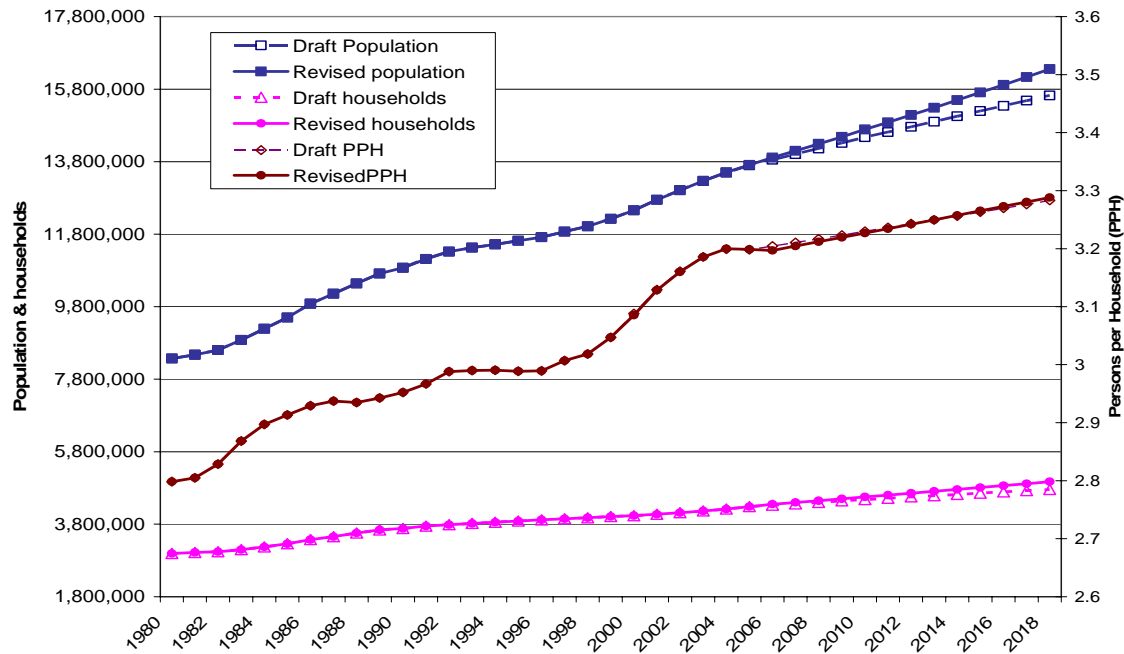
Figure 54: SCE Planning Area Residential Peak



Source: California Energy Commission, 2007.

Figures 55 and 56 provide comparisons of the residential drivers used in the revised 2008 forecast with those used in the draft 2008 forecast. Values used in the draft 2008 forecast were similar to those used in the *CED 2006* forecast. Figure 55 provides comparisons of total population, total households, and persons per household projections. The revised 2008 forecast of total population is higher than the draft 2008 forecast. This is due to the revised Department of Finance long-term population forecast increasing population projections for the SCE planning area. In addition, incorporation of updated historic estimates leads to a slight downward revision in projected persons per household in the short term. However, the net impact yields an increase in projected household growth over the forecast period. The revised 2008 persons per household projections incorporate annual Department of Finance E-5A interim updates to county population and household estimates through 2006. Inclusion of these estimates slightly increases the growth in persons per household over the forecast period. The revised 2008 projected growth in persons per household per year is assumed to be half of the annual 1990–2006 growth.

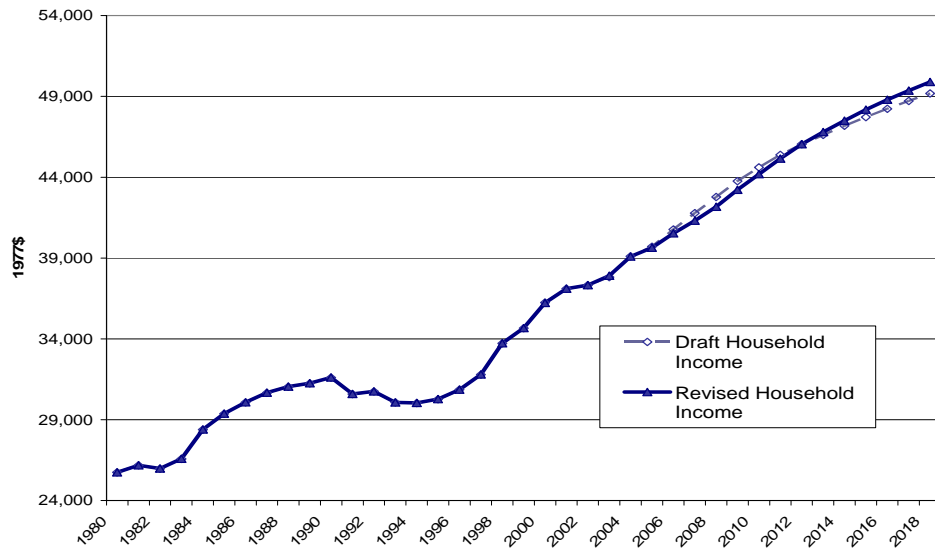
**Figure 55: SCE Planning Area
Residential Demographic Projections**



Source: California Energy Commission, 2007.

Figure 56 provides a comparison of household income between the revised 2008 forecast and the draft 2008 forecasts. Household income is derived as the product of per capita income and persons per household. The revised 2008 projection starts from a slightly lower 2007 value, but at a slightly higher rate in the short- to mid-term because of a continued optimistic economic forecast. The higher growth continues through the forecast period so that by the last half of the forecast period, the revised 2008 forecast of household income is greater than that projected in the draft 2008 forecast. The higher household income growth serves to increase forecasted residential consumption in the short term.

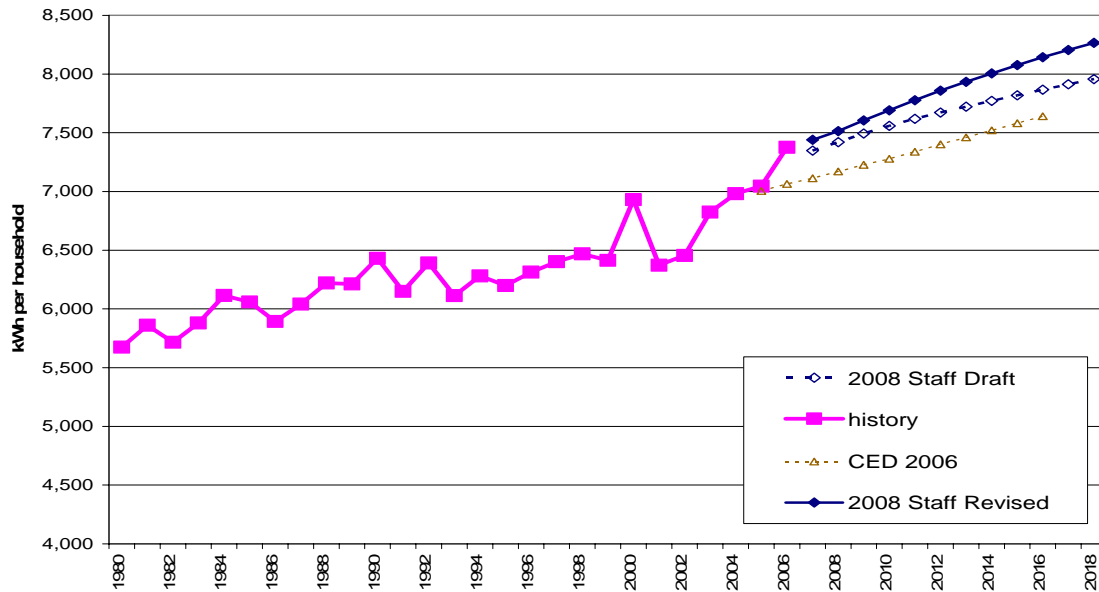
Figure 56: SCE Planning Area Household Income Projections



Source: California Energy Commission, 2007.

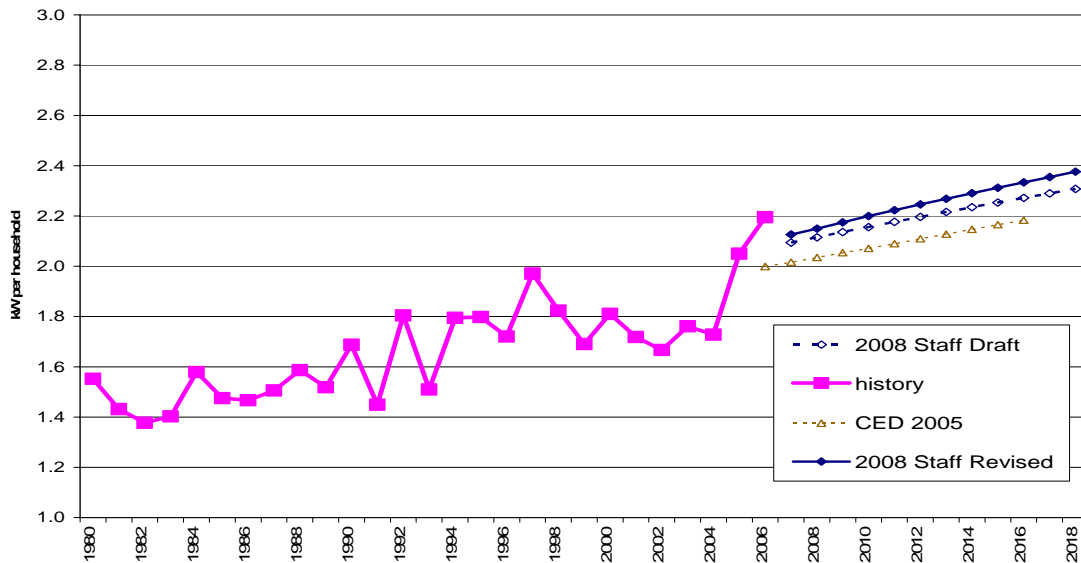
Figures 57 and 58 present comparisons of energy use per household between the forecasts. Figure 57 is a comparison of annual electricity use per household, and Figure 58 is a comparison of peak demand per household. The revised 2008 forecast of energy use per household and peak use per household is somewhat higher than that projected in both of the previous forecasts. This is primarily due to higher short-term household income growth projections and higher persons per household estimates. The increased growth rate seen in the 2008 forecast is caused by the projected increase in population in the Inland Empire, where use per household is higher due to climate differences. Differences in peak use per household are primarily driven by the underlying consumption forecasts.

Figure 57: SCE Planning Area Energy Use per Household



Source: California Energy Commission, 2007.

Figure 58: SCE Planning Area Peak Use per Household

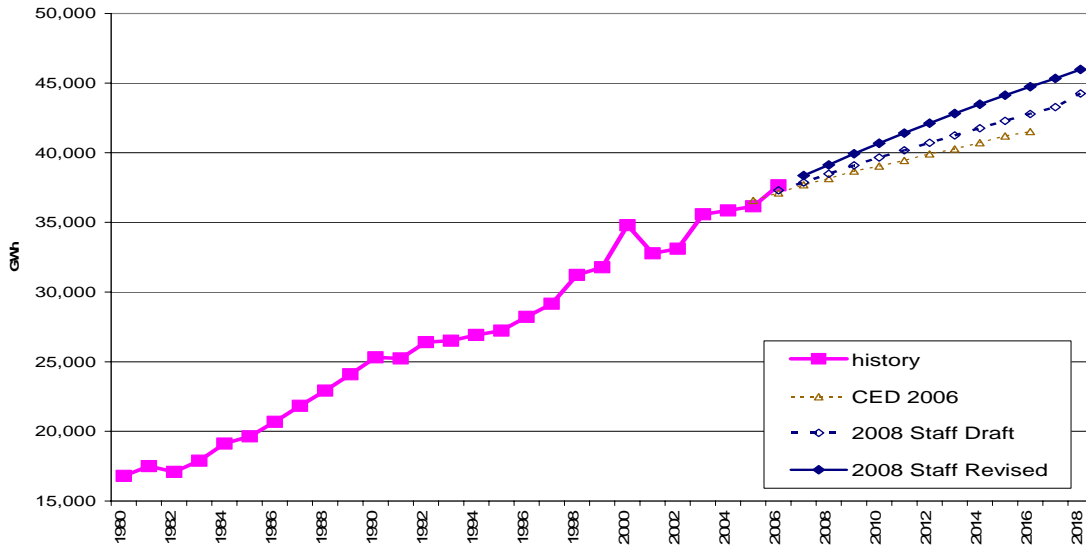


Source: California Energy Commission, 2007.

Commercial Building Sector

Figure 59 provides a comparison of the commercial building sector forecasts. The revised 2008 forecast is higher than the previous forecasts throughout the entire forecast period. The forecast differences are driven by increased projections of commercial floor space. Floor space projections were updated using revised demographic and economic projections.

Figure 59: SCE Planning Area Commercial Consumption



Source: California Energy Commission, 2007.

Figure 60 presents the revised 2008 commercial forecast by climate zone. While the greatest growth is in the Inland Empire, it is not as fast as the residential sector growth.

Figure 60: SCE Planning Area Commercial Electricity Forecast by Climate Zone

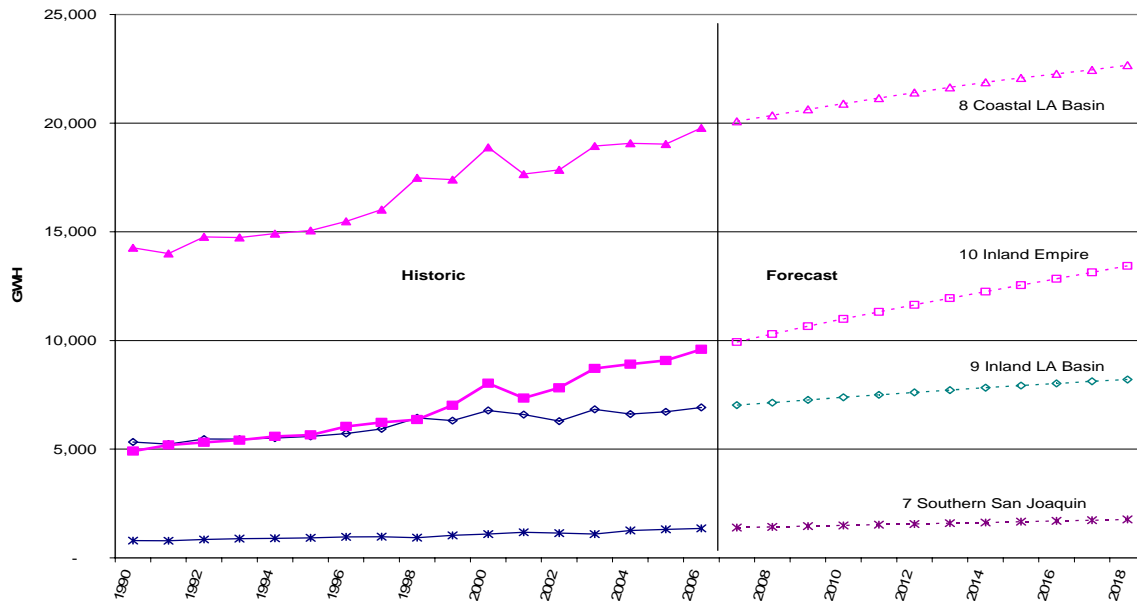
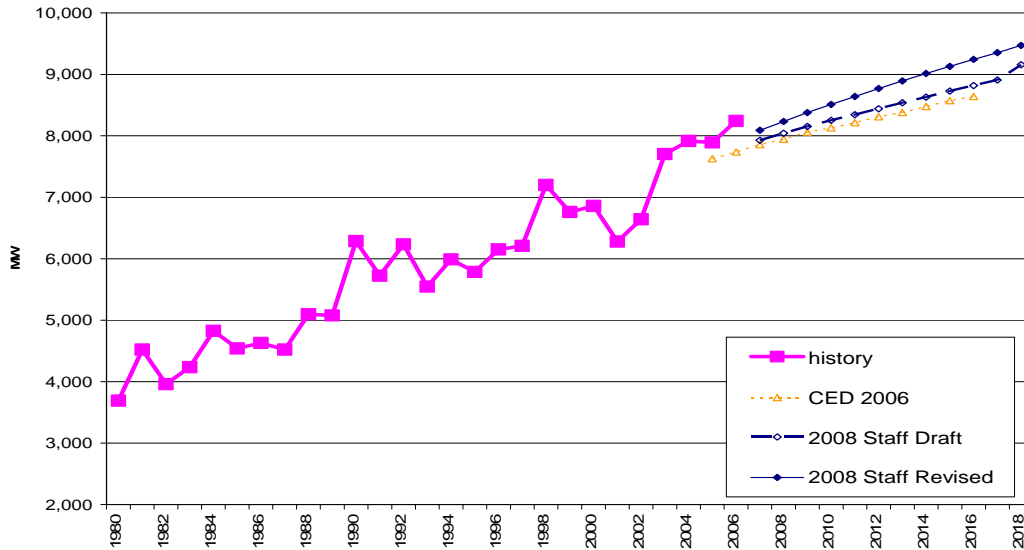


Figure 61 provides a comparison of the commercial peak demand forecasts. Growth in the commercial peak demand forecasts is driven primarily by the underlying electricity consumption forecasts. Therefore, the consumption and peak forecasts exhibit the same patterns.

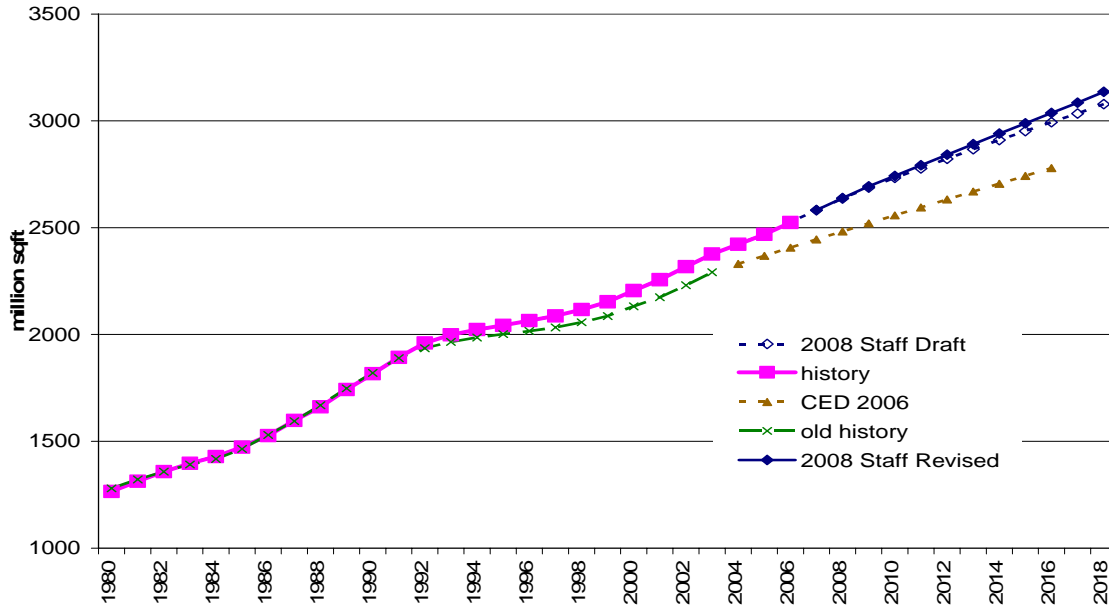
Figure 61: SCE Planning Area Commercial Sector Peak



Source: California Energy Commission, 2007.

In staff's commercial building sector forecasting model, floor space by building type is the key driver for energy consumption and peak demand. **Figure 62** provides a comparison of total commercial floor space projections. The revised 2008 floor space projections are slightly higher throughout the forecast period than those used in the draft 2008 forecast because of updated economic and demographic projections, described in Chapter 1.

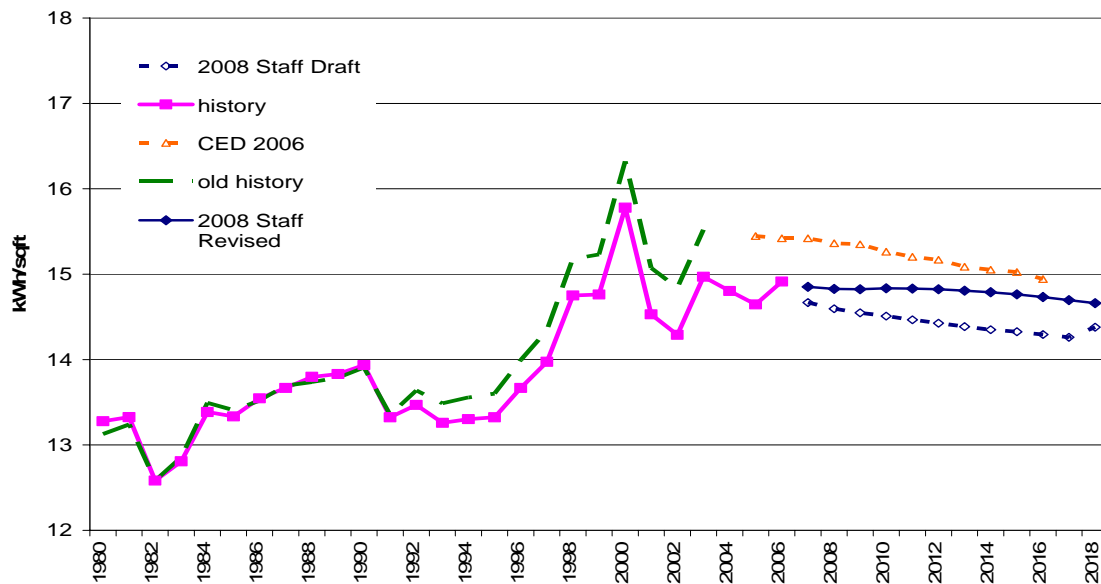
Figure 62: SCE Planning Area Commercial Floor Space



Source: California Energy Commission, 2007.

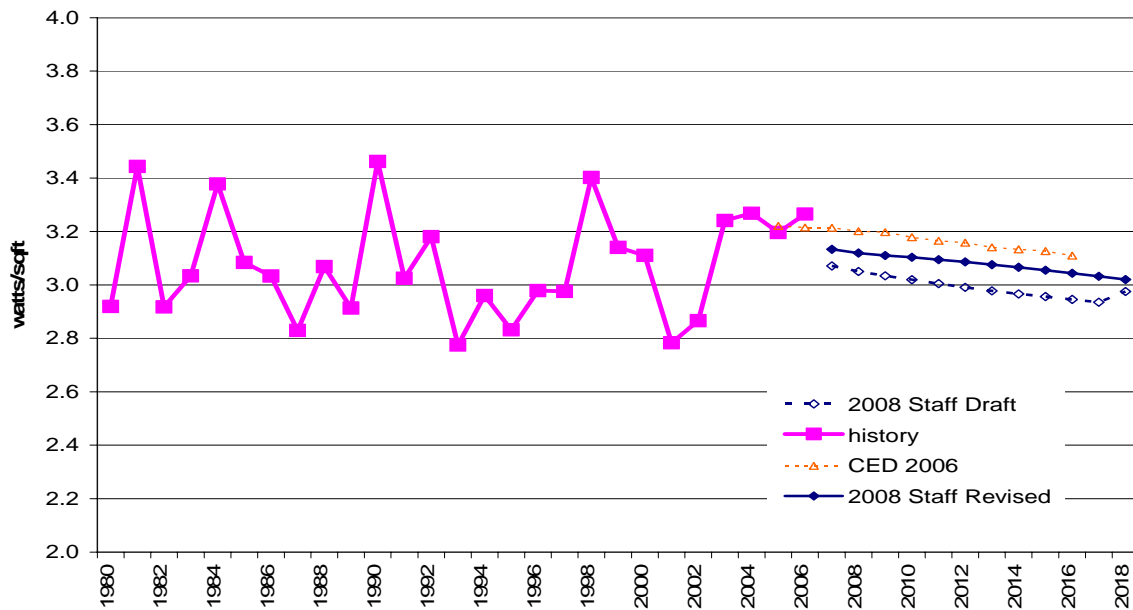
Figures 63 and 64 show historic and projected commercial sector annual energy and peak use per square foot, respectively. Figure 63 presents changes in annual use per square foot based on historic floor space estimates. The projection of use per square foot in the revised 2008 forecast is relatively constant in the beginning of the forecast period and declines slightly toward the end of the forecast period. This is in contrast to the constant decline shown in the draft 2008 forecast. This change is caused by reduced impacts of lighting retrofits in the forecast period. A similar pattern can be seen in the projection of commercial peak use per square foot, as shown in Figure 64. The higher starting values, in both instances, result from revised estimates of historic use. Both the energy and peak forecasts decline by the end of the forecast period due to projected impacts of commercial building and appliance standards.

Figure 63: SCE Planning Area Commercial kWh per Square Foot



Source: California Energy Commission, 2007.

Figure 64: SCE Planning Area Commercial Watts per Square Foot

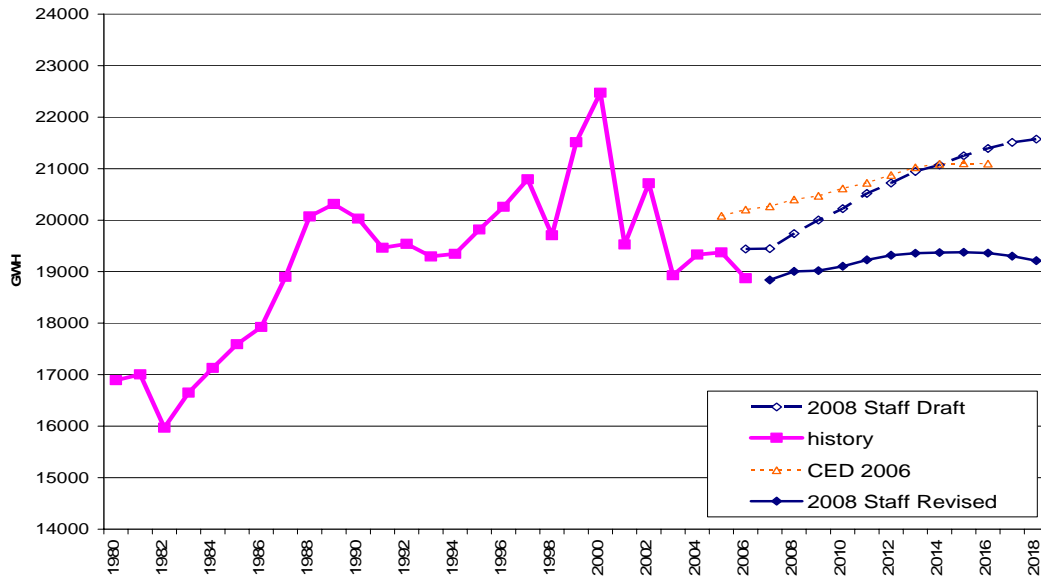


Source: California Energy Commission, 2007.

Industrial Sector

Figure 65 provides comparisons of the forecasts' industrial sector electricity consumption for the SCE planning area. The revised 2008 forecast starts from a lower point than draft CED 2006 forecast and grows at a slower rate over the forecast period. This produces a greatly reduced industrial forecast compared to the previous forecasts. The lower starting point is partly due to the reallocation of historic "unclassified" consumption into the industrial sector at a lower level than was done previously. The lower forecast reflects revised assumptions about energy intensity trends that are more consistent with historic energy use patterns.

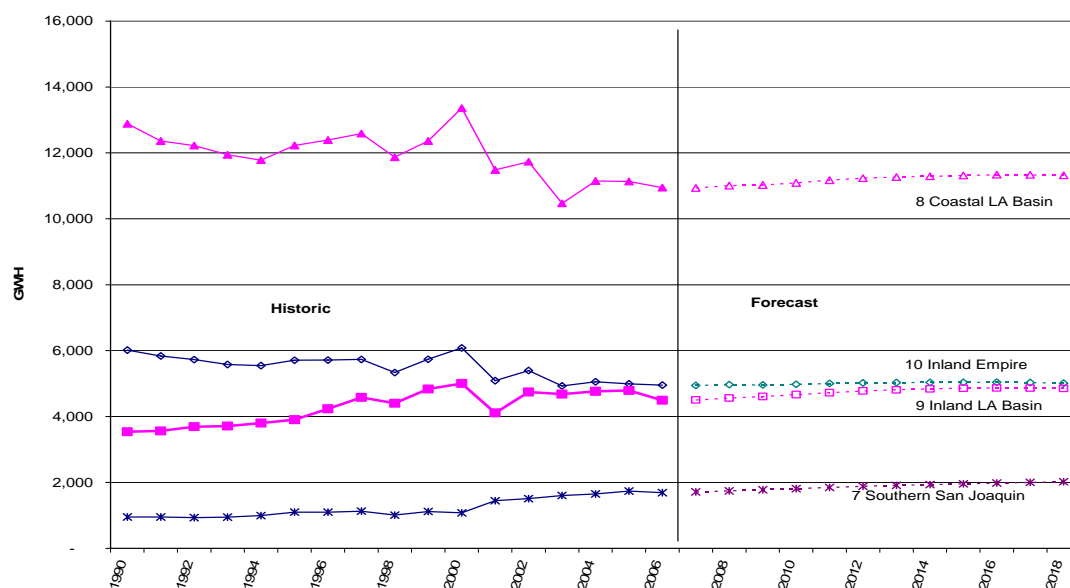
Figure 65: SCE Planning Area Industrial Consumption



Source: California Energy Commission, 2007.

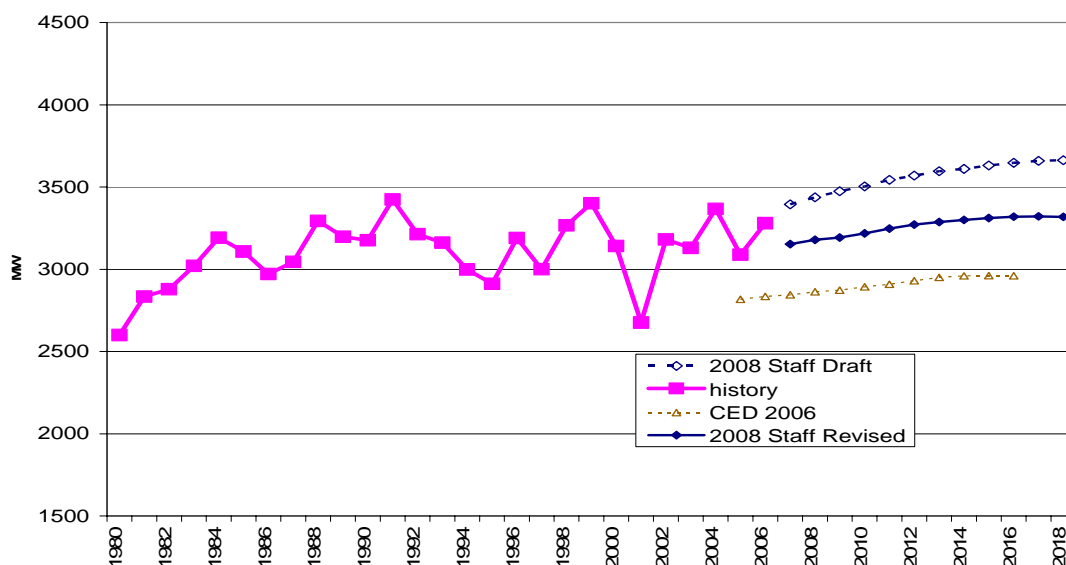
Figure 66 presents the SCE industrial sector forecast by climate zone. The industrial sector forecast increases slightly in the southern San Joaquin region and is relatively flat in the remainder of the climate zones. **Figure 67** provides a comparison of the industrial sector peak forecasts. Re-estimation of the industrial sector peak causes the draft 2008 industrial sector peak to start at a higher value. Forecasted growth patterns are similar to those seen in the electricity consumption case.

Figure 66: SCE Planning Industrial Electricity Forecast by Climate Zone



Source: California Energy Commission, 2007.

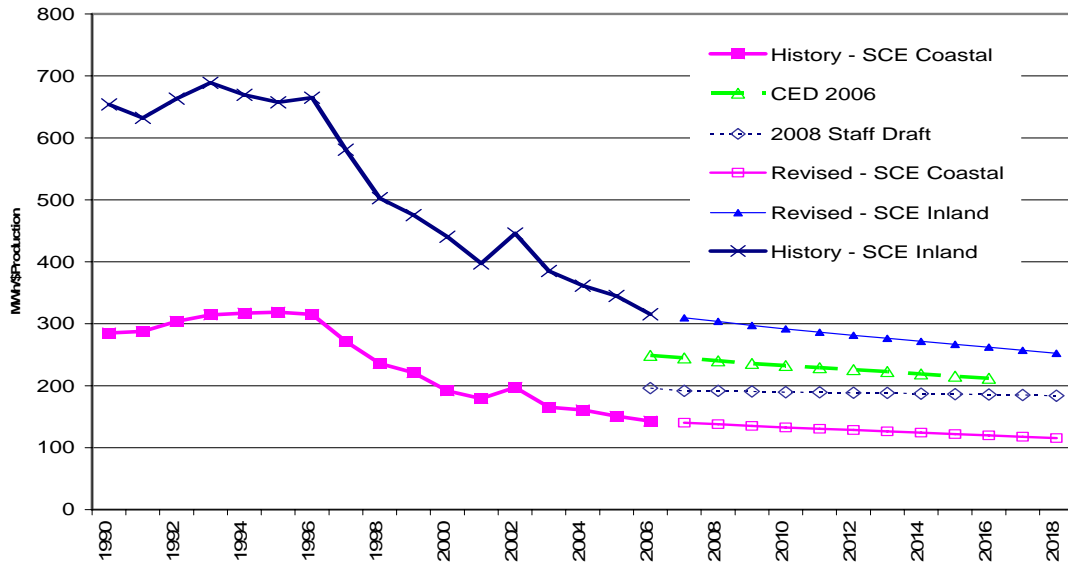
Figure 67: SCE Planning Area Industrial Sector Peak



Source: California Energy Commission, 2007.

Figure 68 provides a comparison of electricity use per dollar of industrial production value between the revised 2008 forecast and previous forecasts. In the revised 2008 forecast, industrial production drivers were developed by coastal and inland zones in order to facilitate a climate region forecast for the SCE industrial sector. The revised 2008 forecast shows a greater decline in use per value added in the inland area than in the coastal zone.

Figure 68: SCE Planning Area Industrial Peak Use per Production Unit

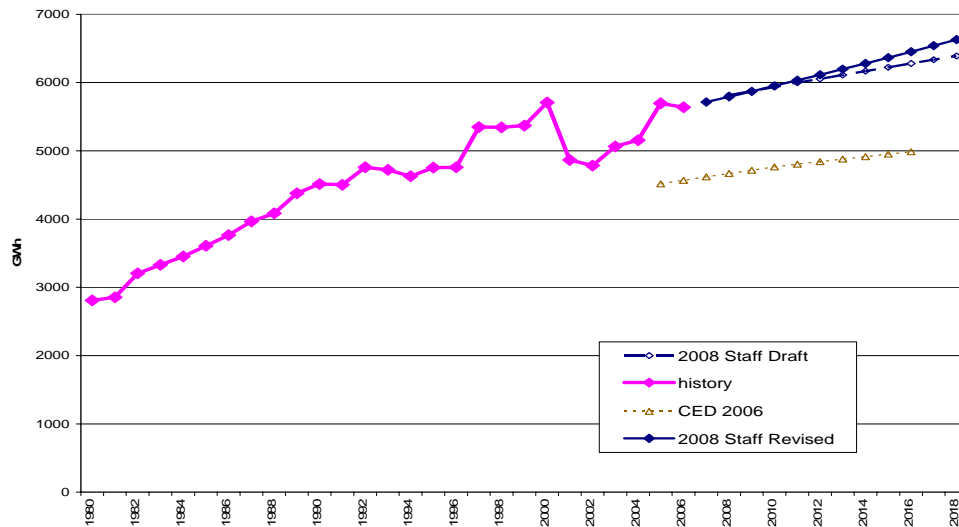


Source: California Energy Commission, 2007.

Other Sectors

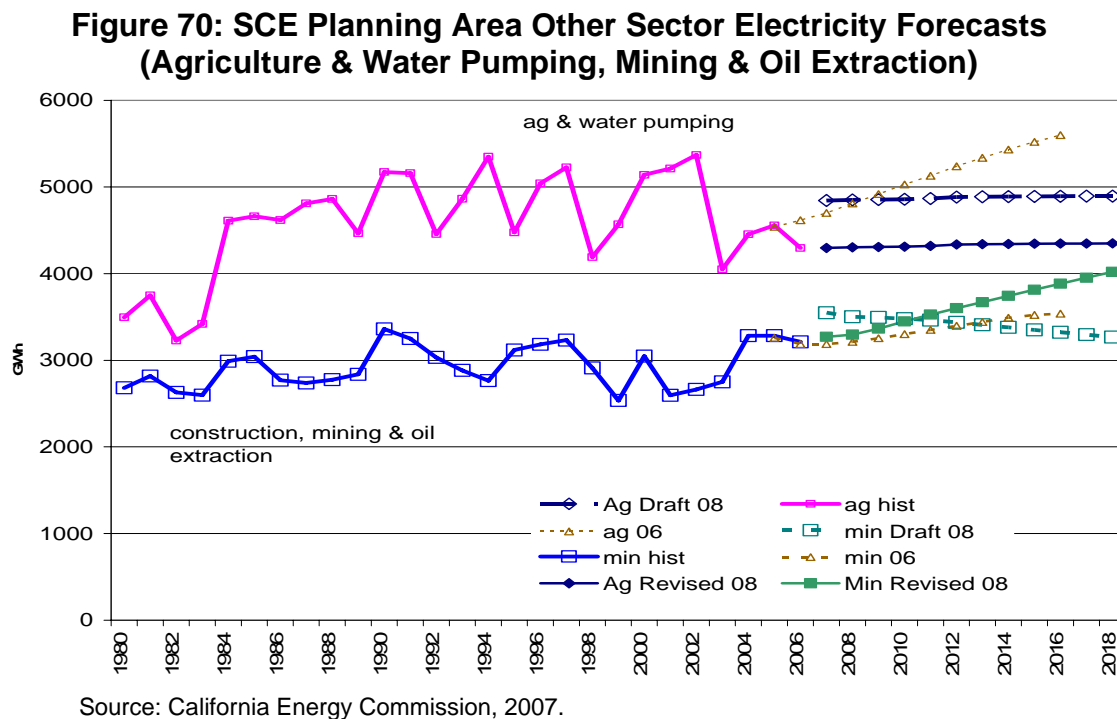
Figure 69 provides a comparison of the electricity consumption forecasts for the transportation, communication, and utilities and streetlighting sectors. The revised 2008 transportation, communication, and utilities and streetlighting forecast is slightly higher than the draft 2008 forecast because of higher economic and demographic drivers.

Figure 69: SCE Planning Area Transportation, Communication, and Utilities and Streetlighting Sector Electricity Forecasts



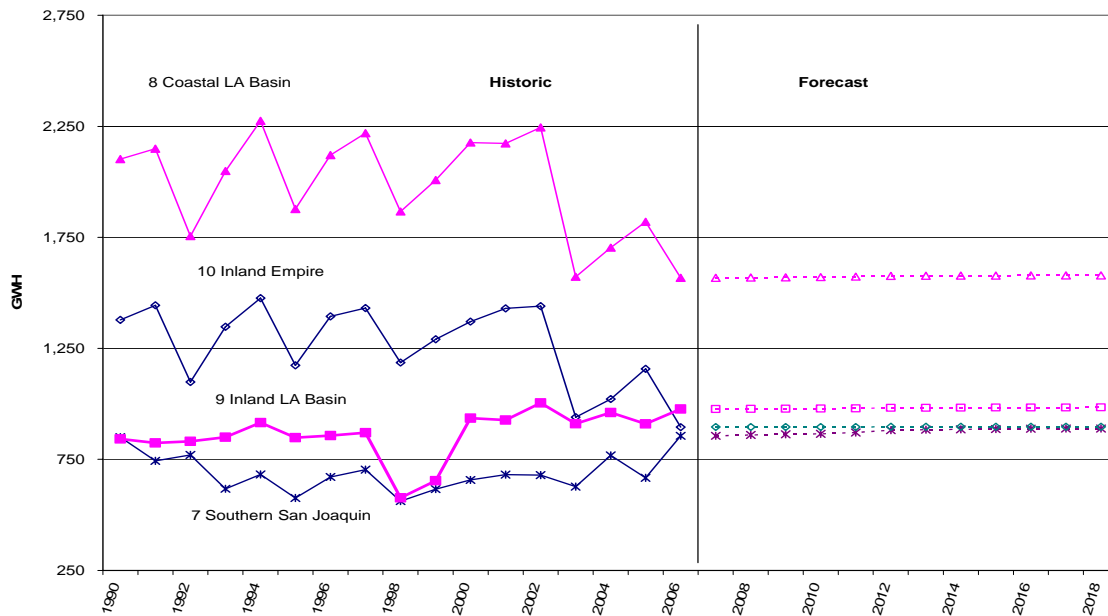
Source: California Energy Commission, 2007.

Figure 70 provides a comparison of the electricity consumption forecasts for the agriculture and water pumping and mining and oil extraction sectors. The revised 2008 agriculture and water pumping forecast is lower due to a lower starting point caused by inclusion of 2006 historic consumption estimates. The revised 2008 forecast growth rate is similar to the growth rate of the draft 2008 forecast. Both 2008 forecasts growth rates are lower than the *CED 2006* growth rate due to a flatter trend projected in electricity used for urban water pumping. The revised 2008 mining and oil extraction sector forecast is higher than the draft 2008 forecast because of increases in economic drivers used for that sector.



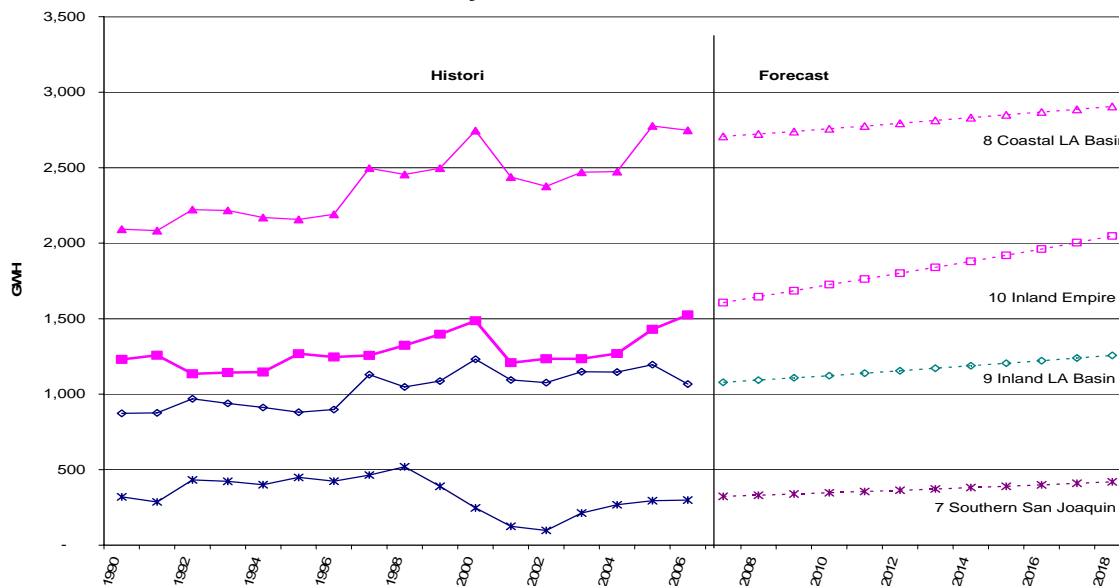
Figures 71 and 72 present the remaining sector forecasts of electricity consumption by climate zone. Growth in the transportation, communication, and utilities and streetlighting sectors mimics the population growth of the climate zones. **Figure 73** provides a comparison of the combined peak for these sectors between the forecasts. The revised 2008 forecast starts from a lower initial point in 2007, but grows at a similar rate to the draft 2008 forecast.

Figure 71: SCE Planning Area Agriculture and Water Pumping Electricity Forecast by Climate Zone



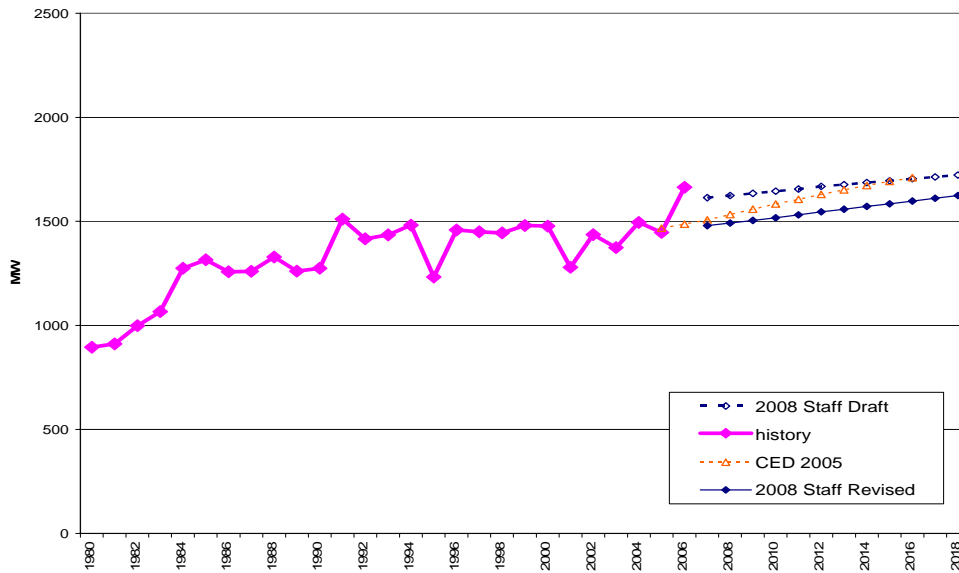
Source: California Energy Commission, 2007.

Figure 72: SCE Planning Area TCU and Streetlighting Electricity Forecast by Climate Zone



Source: California Energy Commission, 2007.

Figure 73: SCE Planning Area Other Sector Peak



Source: California Energy Commission, 2007.

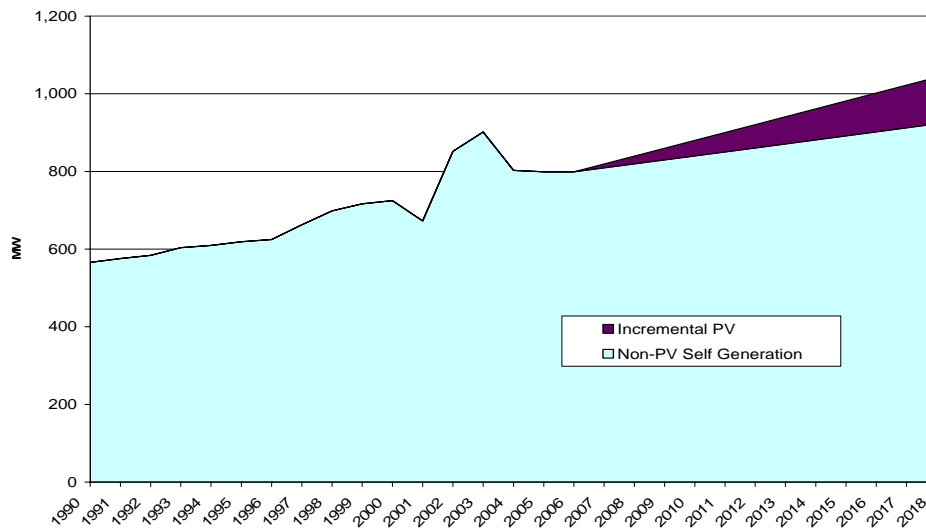
Electricity Prices

As in the draft forecast, the revised 2008 forecast used prices which are held constant (in real terms) at the 2005 level for all sectors. This is in contrast to the declining price forecast which was used in the *CED 2006* price forecast.

Self Generation

Figure 74 shows the revised 2008 forecast of self-generation demand. Based on recent patterns of growth reported under the Self-Generation Incentive Program, the ERP, and the California Solar Initiative, the forecast assumes that an additional 20 MW per year of load will be served by photovoltaic or other self-generation technologies.

Figure 74: SCE Area Self-Generation Peak Demand Forecast



Source: California Energy Commission, 2007.

Conservation Savings Embedded in the Forecast

As discussed in Chapter 1, savings from building and appliance standards through 2005 are modeled in the Energy Commission residential and commercial demand forecast models. Savings from historic public agency and utility programs funded through 2008 are also included. To estimate the magnitude of these savings, the models are run without these programs—in effect, in the chronological order of the program’s occurrence. The savings are then calculated by subtracting the results of the run with the program in effect from the results without the program in effect. A condensed version of the results of this analysis is presented here as a partial estimate of savings which are embedded in the forecast. **Table 19** presents electricity consumption savings, by broad program category, for selected years. **Table 20** presents similar estimates of peak savings. These tables do not quantify the effects of decreasing energy intensity (whether market or program driven) in other sectors.

Table 19: SCE Planning Area Electricity Conservation Savings Estimates

	1990	2000	2005	2008	2013	2018
Residential Energy Savings (GWH)						
Building Standards	1088	1393	1621	1885	2293	2717
Appliance Standards	1223	2567	3256	3637	4200	4709
Utility and Public Agency Programs	255	168	519	533	542	542
Market and Price Effects	9	17	23	26	30	35
Total Residential Savings	2576	4145	5419	6080	7065	8003
Commercial Energy Savings (GWH)						
Building Standards	565	1585	2326	2879	3942	5059
Appliance Standards	384	1109	1551	1854	2407	2959
Utility and Public Agency Programs	89	443	885	766	751	736
Market and Price Effects	2779	858	2861	3912	4411	4780
Total Commercial Savings	3817	3996	7623	9410	11511	13534
Total Energy Savings	6393	8141	13042	15490	18576	21537

Source: California Energy Commission, 2007.

Table 20: SCE Planning Area Peak Conservation Savings Estimates

	1990	2000	2005	2008	2013	2018
Residential Peak Savings (MW)						
Building Standards	679	874	1018	1115	1254	1408
Appliance Standards	159	334	423	473	546	612
Utility and Public Agency Programs	84	57	199	204	207	207
Market and Price Effects	2	4	5	6	7	8
Total	924	1268	1645	1798	2014	2235
Residential Peak Savings (MW)						
Building Standards	130	365	535	662	907	1164
Appliance Standards	88	255	357	426	554	681
Utility and Public Agency Programs	17	84	169	146	143	140
Market and Price Effects	639	197	658	900	1014	1099
Total	874	901	1718	2134	2618	3084
Total Peak Savings	1798	2170	3364	3932	4631	5319

Source: California Energy Commission, 2007.

Form 1.1 - SCE Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Electricity Consumption by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1980	16,965	16,799	16,893	2,681	3,496	2,174	637	59,644
1981	17,709	17,496	17,005	2,818	3,749	2,234	621	61,632
1982	17,389	17,085	15,971	2,628	3,226	2,499	707	59,504
1983	18,204	17,887	16,651	2,596	3,418	2,679	651	62,087
1984	19,395	19,126	17,131	2,988	4,611	2,835	618	66,704
1985	19,751	19,634	17,590	3,041	4,661	2,975	633	68,286
1986	19,877	20,678	17,925	2,771	4,618	3,148	618	69,635
1987	20,893	21,836	18,899	2,738	4,811	3,315	651	73,144
1988	22,124	22,927	20,072	2,776	4,861	3,490	595	76,843
1989	22,620	24,100	20,312	2,837	4,465	3,770	609	78,711
1990	23,684	25,308	20,028	3,361	5,173	3,884	632	82,069
1991	23,039	25,227	19,464	3,251	5,160	3,871	632	80,642
1992	24,210	26,398	19,539	3,031	4,456	4,080	678	82,392
1993	23,362	26,504	19,294	2,883	4,864	4,056	666	81,629
1994	24,190	26,916	19,347	2,765	5,348	3,969	659	83,195
1995	24,097	27,225	19,818	3,118	4,475	4,138	616	83,487
1996	24,738	28,219	20,257	3,183	5,042	4,125	633	86,197
1997	25,270	29,160	20,793	3,232	5,225	4,702	647	89,029
1998	25,749	31,220	19,705	2,910	4,191	4,669	677	89,120
1999	25,726	31,779	21,512	2,536	4,570	4,720	650	91,491
2000	27,980	34,796	22,475	3,047	5,140	5,035	674	99,146
2001	25,970	32,783	19,528	2,595	5,212	4,166	700	90,955
2002	26,577	33,111	20,714	2,662	5,369	4,078	706	93,218
2003	28,426	35,585	18,929	2,750	4,050	4,366	700	94,807
2004	29,463	35,860	19,332	3,282	4,454	4,452	704	97,548
2005	30,199	36,156	19,373	3,282	4,555	4,991	705	99,261
2006	32,093	37,652	18,870	3,212	4,296	4,932	706	101,762
2007	32,757	38,451	18,844	3,252	4,296	5,001	714	103,316
2008	33,456	39,222	19,021	3,261	4,303	5,070	722	105,054
2009	34,239	40,023	19,049	3,322	4,307	5,141	730	106,812
2010	35,026	40,778	19,145	3,398	4,311	5,214	738	108,610
2011	35,808	41,504	19,277	3,466	4,320	5,286	747	110,408
2012	36,592	42,221	19,378	3,531	4,336	5,359	755	112,173
2013	37,349	42,913	19,425	3,593	4,339	5,434	763	113,815
2014	38,105	43,584	19,444	3,657	4,342	5,509	772	115,413
2015	38,873	44,224	19,454	3,719	4,345	5,585	780	116,982
2016	39,631	44,840	19,444	3,783	4,346	5,663	789	118,497
2017	40,380	45,442	19,386	3,844	4,347	5,742	798	119,938
2018	41,135	46,084	19,301	3,904	4,348	5,822	807	121,400

Annual Growth Rates (%)

1980-1990	3.4	4.2	1.7	2.3	4.0	6.0	-0.1	3.2
1990-2000	1.7	3.2	1.2	-1.0	-0.1	2.6	0.7	1.9
2000-2006	2.3	1.3	-2.9	0.9	-2.9	-0.3	0.8	0.4
2006-2011	2.2	2.0	0.4	1.5	0.1	1.4	1.1	1.6
2011-2018	2.0	1.5	0.0	1.7	0.1	1.4	1.1	1.4
2006-2018	2.1	1.7	0.2	1.6	0.1	1.4	1.1	1.5

Form 1.1b - SCE Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Electricity Sales by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1990	23,684	24,848	17,550	3,102	5,163	3,717	632	78,697
1991	23,039	24,753	16,980	2,960	5,150	3,699	632	77,213
1992	24,210	25,893	17,045	2,735	4,446	3,906	678	78,911
1993	23,362	25,965	16,724	2,662	4,851	3,802	666	78,032
1994	24,190	26,374	16,763	2,535	5,336	3,707	659	79,564
1995	24,097	26,675	17,204	2,871	4,463	3,872	616	79,799
1996	24,738	27,668	17,609	2,937	5,029	3,859	633	82,473
1997	25,270	28,586	17,970	2,972	5,213	4,424	647	85,082
1998	25,749	30,603	16,738	2,633	4,179	4,380	677	84,959
1999	25,726	31,141	18,476	2,239	4,570	4,419	650	87,220
2000	27,980	34,149	19,392	2,770	5,140	4,723	674	94,827
2001	25,970	32,674	16,819	1,605	5,212	3,968	700	86,948
2002	26,577	32,934	17,283	1,487	5,369	3,788	706	88,143
2003	28,426	35,394	15,373	1,481	4,050	4,011	700	89,435
2004	29,463	35,701	16,290	2,025	4,454	4,129	704	92,766
2005	30,199	36,005	16,314	2,030	4,555	4,693	705	94,501
2006	32,093	37,439	15,899	2,013	4,296	4,710	706	97,156
2007	32,754	38,214	15,835	2,037	4,296	4,776	714	98,624
2008	33,448	38,960	15,973	2,030	4,303	4,842	722	100,279
2009	34,227	39,737	15,964	2,076	4,307	4,910	730	101,952
2010	35,010	40,467	16,022	2,136	4,311	4,981	738	103,666
2011	35,789	41,168	16,116	2,190	4,320	5,050	747	105,379
2012	36,569	41,862	16,179	2,239	4,336	5,120	755	107,059
2013	37,322	42,529	16,188	2,285	4,339	5,191	763	108,617
2014	38,074	43,176	16,169	2,334	4,342	5,264	772	110,131
2015	38,839	43,791	16,141	2,382	4,345	5,338	780	111,615
2016	39,593	44,382	16,093	2,430	4,346	5,412	789	113,046
2017	40,338	44,960	15,997	2,475	4,347	5,488	798	114,403
2018	41,089	45,577	15,874	2,520	4,348	5,566	807	115,781

Annual Growth Rates (%)

1980-1990	3.4	4.0	0.5	1.5	4.0	5.5	-0.1	2.9
1990-2000	1.7	3.2	1.0	-1.1	0.0	2.4	0.7	1.9
2000-2006	2.3	1.5	-3.3	-5.2	-2.9	0.0	0.8	0.4
2006-2011	2.2	1.9	0.3	1.7	0.1	1.4	1.1	1.6
2011-2018	2.0	1.5	-0.2	2.0	0.1	1.4	1.1	1.4
2006-2018	2.1	1.7	0.0	1.9	0.1	1.4	1.1	1.5

Form 1.2 - SCE
California Energy Demand 2008-2018 Staff Revised Forecast
Net Energy for Load (GWh)

Year	Total Consumption	Net Losses	Gross Generation	Non-PV Self Generation	Incremental PV	Total Private Supply	Net Energy for Load
1990	82,069	5,351	87,420	3,372	0	3,372	84,048
1991	80,642	5,251	85,893	3,429	0	3,429	82,464
1992	82,392	5,366	87,758	3,480	0	3,480	84,277
1993	81,629	5,306	86,935	3,597	0	3,597	83,338
1994	83,195	5,410	88,605	3,631	0	3,631	84,974
1995	83,487	5,426	88,914	3,689	0	3,689	85,225
1996	86,197	5,608	91,805	3,724	0	3,724	88,081
1997	89,029	5,786	94,815	3,948	0	3,948	90,867
1998	89,120	5,777	94,897	4,161	0	4,161	90,736
1999	91,491	5,931	97,422	4,271	0	4,271	93,151
2000	99,146	6,448	105,594	4,319	0	4,319	101,276
2001	90,955	5,912	96,868	4,007	0	4,007	92,861
2002	93,218	5,994	99,212	5,075	0	5,075	94,137
2003	94,807	6,082	100,888	5,371	0	5,371	95,517
2004	97,548	6,308	103,856	4,782	0	4,782	99,074
2005	99,261	6,426	105,687	4,760	0	4,760	100,927
2006	101,762	6,607	108,368	4,606	0	4,606	103,762
2007	103,214	6,701	109,916	4,666	26	4,691	105,332
2008	104,957	6,816	111,773	4,725	51	4,776	107,101
2009	106,709	6,931	113,640	4,784	77	4,860	108,890
2010	108,503	7,049	115,552	4,842	102	4,945	110,722
2011	110,301	7,167	117,468	4,901	128	5,029	112,554
2012	112,063	7,283	119,346	4,960	153	5,113	114,350
2013	113,705	7,391	121,095	5,019	179	5,198	116,016
2014	115,302	7,495	122,797	5,078	204	5,282	117,633
2015	116,872	7,598	124,470	5,137	230	5,367	119,221
2016	118,389	7,697	126,086	5,196	255	5,451	120,750
2017	119,834	7,791	127,625	5,254	281	5,535	122,202
2018	121,298	7,887	129,185	5,313	306	5,620	123,675

Annual Growth Rates (%)

1990-2000	1.9	1.9	1.9	2.5		2.5	1.9
2000-2006	0.4	0.4	0.4	1.1		1.1	0.4
2006-2011	1.6	1.6	1.6	1.3		1.8	1.6
2011-2018	1.4	1.4	1.4	1.2	13.3	1.6	1.4
2006-2018	1.5	1.5	1.5	1.2		1.7	1.5

Form 1.3 - SCE Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Coincident Peak Demand by Sector (MW)

Year	Residential	Commercial	Industrial	Agricultural	Other	Total Demand
1980	4,640	3,693	2,600	567	328	11,829
1981	4,326	4,521	2,834	573	338	12,592
1982	4,191	3,961	2,879	541	457	12,029
1983	4,342	4,237	3,021	572	494	12,666
1984	5,009	4,826	3,192	758	517	14,301
1985	4,809	4,541	3,107	787	529	13,773
1986	4,949	4,630	2,971	728	530	13,808
1987	5,207	4,521	3,045	718	542	14,032
1988	5,644	5,098	3,294	746	583	15,365
1989	5,530	5,077	3,198	695	565	15,065
1990	6,215	6,287	3,176	729	548	16,956
1991	5,429	5,727	3,424	839	675	16,093
1992	6,836	6,233	3,214	731	671	17,685
1993	5,770	5,547	3,161	750	674	15,903
1994	6,913	5,990	2,998	837	629	17,367
1995	6,989	5,786	2,912	643	576	16,906
1996	6,742	6,151	3,190	787	654	17,523
1997	7,781	6,210	3,001	743	680	18,415
1998	7,259	7,200	3,267	660	782	19,167
1999	6,782	6,761	3,401	703	772	18,418
2000	7,309	6,859	3,141	731	722	18,762
2001	7,003	6,280	2,676	715	554	17,229
2002	6,863	6,642	3,181	780	644	18,109
2003	7,334	7,704	3,130	631	732	19,530
2004	7,292	7,916	3,366	721	769	20,065
2005	8,788	7,891	3,088	697	740	21,204
2006	9,552	8,242	3,279	684	843	22,602
2007	9,355	8,091	3,153	658	822	22,079
2008	9,564	8,232	3,179	659	833	22,467
2009	9,786	8,377	3,193	660	845	22,860
2010	10,012	8,511	3,218	660	857	23,258
2011	10,230	8,640	3,247	662	869	23,648
2012	10,451	8,768	3,271	665	881	24,036
2013	10,671	8,893	3,287	666	893	24,410
2014	10,896	9,014	3,300	666	905	24,782
2015	11,124	9,131	3,311	667	918	25,151
2016	11,353	9,243	3,320	667	931	25,513
2017	11,583	9,353	3,321	667	944	25,868
2018	11,817	9,471	3,319	667	957	26,231

Annual Growth Rates (%)

1980-1990	3.0	5.5	2.0	2.5	5.3	3.7
1990-2000	1.6	0.9	-0.1	0.0	2.8	1.0
2000-2006	4.6	3.1	0.7	-1.1	2.6	3.2
2006-2011	1.4	0.9	-0.2	-0.7	0.6	0.9
2011-2018	2.1	1.3	0.3	0.1	1.4	1.5
2006-2018	1.8	1.2	0.1	-0.2	1.1	1.2

Form 1.4 - SCE Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Peak Demand (MW)

Year	Total End Use Load	Net Losses	Gross Generation	Non-PV Self Generation	Incremental PV	Total Private Supply	Net Peak Demand	Load Factor (%)
1980	11,829	895	12,724	50	0	50	12,674	57
1981	12,592	953	13,545	51	0	51	13,494	56
1982	12,029	908	12,937	86	0	86	12,851	56
1983	12,666	951	13,617	157	0	157	13,460	56
1984	14,301	1,072	15,374	190	0	190	15,183	54
1985	13,773	1,030	14,803	219	0	219	14,584	57
1986	13,808	1,031	14,838	246	0	246	14,592	58
1987	14,032	1,043	15,075	307	0	307	14,768	60
1988	15,365	1,128	16,493	518	0	518	15,975	59
1989	15,065	1,103	16,168	546	0	546	15,622	61
1990	16,956	1,246	18,201	566	0	566	17,635	54
1991	16,093	1,179	17,273	576	0	576	16,697	56
1992	17,685	1,300	18,984	584	0	584	18,400	52
1993	15,903	1,163	17,065	604	0	604	16,461	58
1994	17,367	1,274	18,640	610	0	610	18,031	54
1995	16,906	1,238	18,144	619	0	619	17,524	56
1996	17,523	1,284	18,808	625	0	625	18,183	55
1997	18,415	1,349	19,764	663	0	663	19,101	54
1998	19,167	1,404	20,571	699	0	699	19,873	52
1999	18,418	1,345	19,763	717	0	717	19,046	56
2000	18,762	1,371	20,133	725	0	725	19,408	60
2001	17,229	1,258	18,487	673	0	673	17,814	60
2002	18,109	1,312	19,421	852	0	852	18,569	58
2003	19,530	1,416	20,946	902	0	902	20,044	54
2004	20,065	1,464	21,529	803	0	803	20,726	55
2005	21,204	1,551	22,755	799	0	799	21,956	52
2006	22,602	1,657	24,259	799	0	799	23,460	50
2007	22,079	1,616	23,695	809	10	819	22,876	53
2008	22,467	1,645	24,112	820	20	840	23,272	53
2009	22,860	1,674	24,534	830	30	860	23,674	53
2010	23,258	1,704	24,962	840	40	880	24,082	52
2011	23,648	1,733	25,380	851	50	900	24,480	52
2012	24,036	1,761	25,798	861	60	921	24,877	52
2013	24,410	1,789	26,199	871	70	941	25,258	52
2014	24,782	1,816	26,598	881	80	961	25,637	52
2015	25,151	1,844	26,995	892	90	982	26,013	52
2016	25,513	1,870	27,384	902	100	1,002	26,382	52
2017	25,868	1,897	27,765	912	110	1,022	26,742	52
2018	26,231	1,923	28,154	923	120	1,042	27,112	52

Annual Growth Rates (%)

1980-1990	3.7	3.4	3.6	27.4		27.4	3.4	-0.5
1990-2000	1.0	1.0	1.0	2.5		2.5	1.0	0.9
2000-2006	3.2	3.2	3.2	1.6		1.6	3.2	-2.7
2006-2011	0.9	0.9	0.9	1.3		2.4	0.9	0.8
2011-2018	1.5	1.5	1.5	1.2	13.3	2.1	1.5	-0.1
2006-2018	1.2	1.3	1.2	1.2		2.2	1.2	0.3

Form 1.4 - SCE Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Forecast by LSE
Peak Demand (MW) by LSE

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
SCE Service Area Sales by CEC Forecasting Climate Zone													
Zone 7 (Southern San Joaquin)	1,258	1,239	1,264	1,292	1,318	1,347	1,375	1,404	1,430	1,458	1,486	1,515	1,545
Zone 8 (Coastal LA Basin)	8,867	8,687	8,787	8,888	8,992	9,096	9,198	9,289	9,377	9,464	9,542	9,616	9,695
Zone 9 (Inland LA Basin)	4,055	3,903	3,960	4,018	4,076	4,138	4,194	4,250	4,304	4,358	4,410	4,463	4,509
Zone 10 (Inland Empire)	7,467	7,280	7,464	7,652	7,841	8,017	8,199	8,378	8,561	8,743	8,927	9,107	9,294
SCE Service Area Total	21,647	21,109	21,476	21,849	22,227	22,597	22,966	23,321	23,672	24,022	24,365	24,701	25,045
Anaheim	578	566	572	578	584	591	597	602	607	612	617	621	625
Riverside	584	572	587	603	619	634	649	664	679	694	709	724	739
Vernon	187	180	182	182	184	185	187	188	189	190	190	191	191
MWD	192	184	185	185	185	185	186	185	185	186	186	186	186
Bear Valley Electric Service	14	13	13	13	13	14	14	14	14	14	14	14	14
Azusa	65	63	64	64	65	66	67	67	68	69	69	70	70
Banning	49	48	49	50	51	52	54	55	56	57	58	60	61
Colton	93	91	94	96	99	101	103	106	108	110	113	115	117
Rancho Cucamonga	13	13	13	13	14	14	15	15	15	15	16	16	16
Victorville Municipal	4	4	4	4	4	4	5	5	5	5	5	5	5
Boulder City/Parker Davis	18	18	18	18	19	19	20	20	21	21	22	22	23
Anza Electric Cooperative, Inc	14	14	14	15	15	16	16	16	17	17	17	18	18
Valley Electric Association, Inc	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	23,460	22,876	23,272	23,674	24,082	24,480	24,877	25,258	25,637	26,013	26,382	26,742	27,112

Annual Growth
Rate 2007-2018
(%)

2.0%
1.0%
1.3%
2.2%
1.6%
0.9%
2.4%
0.5%
0.1%
0.9%
1.0%
2.3%
2.3%
2.4%
1.8%
2.3%
2.4%
0.0%
1.6%

Electricity Sales by LSE (GWH)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
SCE Service Area Sales by CEC Forecasting Climate Zone													
Zone 7 (Southern San Joaquin)	5,093	5,200	5,306	5,413	5,523	5,637	5,757	5,865	5,973	6,082	6,190	6,299	6,409
Zone 8 (Coastal LA Basin)	43,005	43,421	43,915	44,414	44,944	45,476	45,988	46,446	46,874	47,283	47,672	48,028	48,410
Zone 9 (Inland LA Basin)	16,697	16,942	17,177	17,420	17,658	17,910	18,150	18,374	18,592	18,806	19,017	19,224	19,422
Zone 10 (Inland Empire)	24,113	24,693	25,372	26,060	26,759	27,438	28,112	28,755	29,393	30,027	30,633	31,212	31,789
SCE Service Area Total	88,908	90,257	91,771	93,308	94,884	96,461	98,006	99,439	100,831	102,197	103,513	104,762	106,030
Bear Valley Electric Service	145	147	150	153	156	158	160	162	164	166	168	170	172
Anaheim	2,690	2,718	2,749	2,779	2,810	2,842	2,873	2,901	2,926	2,950	2,973	2,993	3,016
Azusa	256	258	261	264	267	270	273	276	278	280	282	284	286
Banning	146	150	154	159	164	168	173	177	182	186	190	195	199
Colton	342	352	364	375	386	397	408	418	428	438	448	458	467
Rancho Cucamonga	60	62	65	67	69	71	73	75	77	78	80	82	84
Victorville Municipal	25	26	26	27	27	28	29	29	29	30	30	30	31
Metropolitan Water Department	1,233	1,233	1,233	1,234	1,234	1,235	1,237	1,237	1,237	1,238	1,238	1,238	1,238
Riverside	2,038	2,101	2,170	2,241	2,310	2,376	2,443	2,507	2,571	2,635	2,697	2,758	2,820
Boulder City/Parker Davis	111	113	116	119	122	124	127	130	133	136	139	142	145
Vernon	1,150	1,153	1,164	1,169	1,178	1,187	1,196	1,203	1,208	1,213	1,218	1,220	1,222
Anza Electric Cooperative, Inc	46	47	49	50	52	54	55	57	59	60	62	63	65
Valley Electric Association, Inc	7	7	7	7	7	7	7	7	7	7	7	7	7
Total	97,156	98,624	100,279	101,952	103,666	105,379	107,059	108,617	110,131	111,615	113,046	114,403	115,781

1.9%
1.0%
1.2%
2.3%
1.5%
1.4%
1.0%
0.9%
2.6%
2.6%
2.7%
1.6%
0.0%
2.7%
2.3%
0.5%
2.9%
0.0%
1.5%

Form 2.2 - SCE Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Planning Area Economic and Demographic Assumptions

Year	Population	Households	Persons per Household	Real Personal Income (Millions 1977\$)	Industrial Value Added (Millions 2005\$)	Commercial Floorspace (MM Sqft.)
1980	8,366,390	2,989,881	2.80	2,989,881	12,902	1,265
1981	8,476,049	3,021,775	2.80	79,108	13,204	1,313
1982	8,604,473	3,042,087	2.83	79,005	12,795	1,358
1983	8,880,710	3,096,079	2.87	82,281	12,953	1,397
1984	9,189,678	3,172,075	2.90	90,024	13,620	1,429
1985	9,496,544	3,259,611	2.91	95,710	13,994	1,472
1986	9,880,725	3,373,196	2.93	101,422	14,184	1,526
1987	10,157,963	3,458,407	2.94	106,051	14,790	1,598
1988	10,439,494	3,556,992	2.93	110,392	15,557	1,662
1989	10,714,087	3,641,191	2.94	113,767	16,123	1,743
1990	10,871,278	3,682,527	2.95	116,379	16,469	1,816
1991	11,115,544	3,746,675	2.97	114,592	15,937	1,893
1992	11,318,871	3,787,989	2.99	116,484	15,878	1,960
1993	11,426,197	3,821,429	2.99	114,876	15,868	1,999
1994	11,518,356	3,851,515	2.99	115,659	15,791	2,023
1995	11,618,823	3,887,463	2.99	117,663	16,659	2,043
1996	11,714,175	3,918,728	2.99	120,930	16,411	2,065
1997	11,870,277	3,947,715	3.01	125,501	17,471	2,087
1998	12,014,581	3,980,466	3.02	134,208	17,603	2,116
1999	12,223,583	4,011,438	3.05	139,036	17,030	2,153
2000	12,455,827	4,037,295	3.09	146,217	17,401	2,205
2001	12,749,130	4,075,290	3.13	151,156	15,249	2,256
2002	13,010,213	4,117,027	3.16	153,608	14,711	2,317
2003	13,267,848	4,165,495	3.19	157,512	14,289	2,377
2004	13,497,379	4,219,937	3.20	164,982	15,022	2,422
2005	13,697,573	4,286,245	3.20	170,057	15,308	2,469
2006	13,852,159	4,351,353	3.20	176,241	15,553	2,524
2007	14,006,644	4,399,944	3.21	182,260	15,731	2,583
2008	14,160,952	4,449,230	3.22	188,308	16,000	2,639
2009	14,315,087	4,499,234	3.22	194,357	16,215	2,693
2010	14,473,209	4,551,305	3.23	199,897	16,364	2,743
2011	14,617,404	4,601,733	3.24	204,941	16,562	2,792
2012	14,761,542	4,652,826	3.24	209,572	16,660	2,842
2013	14,905,640	4,704,583	3.25	213,844	16,794	2,891
2014	15,049,685	4,757,038	3.26	218,060	16,837	2,940
2015	15,193,676	4,810,187	3.26	222,200	16,930	2,989
2016	15,337,612	4,863,937	3.27	226,266	16,996	3,037
2017	15,481,491	4,918,417	3.28	230,212	17,050	3,085
2018	15,625,329	4,973,656	3.28	234,044	17,056	3,136

Annual Growth Rates (%)

1980-1990	2.7	2.1	0.5	-27.7	2.5	3.7
1990-2000	1.4	0.9	0.5	2.3	0.6	2.0
2000-2006	1.8	1.3	0.6	3.2	-1.9	2.3
2006-2011	1.1	1.1	0.2	3.1	1.3	2.0
2011-2018	1.0	1.1	0.2	1.9	0.4	1.7
2006-2018	1.0	1.1	0.2	2.4	0.8	1.8

CHAPTER 4: SAN DIEGO GAS & ELECTRIC PLANNING AREA

The San Diego Gas & Electric (SDG&E) planning area includes (1) SDG&E bundled retail customers, (2) customers served by non-utility energy service providers (ESPs) using the SDG&E distribution system, and (3) customers served by the City of Escondido.

This chapter first presents forecasts of total and per capita consumption and peak loads for the planning area. It then compares the revised 2008 forecast values to both the draft 2008 and *CED 2006* forecasts. It also discusses the forecasted load factor, jointly determined by the consumption and peak load estimates. The chapter then presents sector consumption and peak load forecasts and compares them at the sector level to both previous forecasts. Finally, the chapter presents estimates of conservation savings embedded in the revised forecast.

Forecast Results

Tables 21 and **22** present comparisons of the planning area electricity consumption and peak demand forecasts for selected years. The revised 2008 electricity consumption forecast, presented in Table 21, is less than 1 percent higher than the draft forecast. This is caused by a revision to historic self-generation estimates that increased historic consumption values. The long-term growth rate of the revised 2008 forecast is virtually identical to the draft 2008 forecast.

**Table 21: SDG&E Planning Area
Electricity Consumption Forecast Comparison**

Consumption (GWH)					
	CED 2006	Staff Draft	Staff Revised	Percent Difference Staff Revised/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	14,926	14,926	14,926	0.00%	0.00%
2000	19,295	19,295	19,294	0.00%	0.00%
2005	19,988	19,595	19,910	-0.39%	1.61%
2008	21,051	21,130	21,304	1.20%	0.82%
2013	22,614	22,812	23,002	1.71%	0.83%
2016	23,490	23,742	23,960	2.00%	0.92%
Average Annual Growth Rates					
1990-2000	2.60%	2.60%	2.60%		
2000-2005	0.71%	0.31%	0.63%		
2005-2008	1.74%	2.55%	2.28%		
2008-2016	1.38%	1.47%	1.48%		
Historic values are shaded					

Source: California Energy Commission, 2007.

Table 22 similarly compares peak forecasts. Differences between the revised 2008 peak forecast and the draft 2008 forecast are similar to those seen in the electricity consumption comparison.

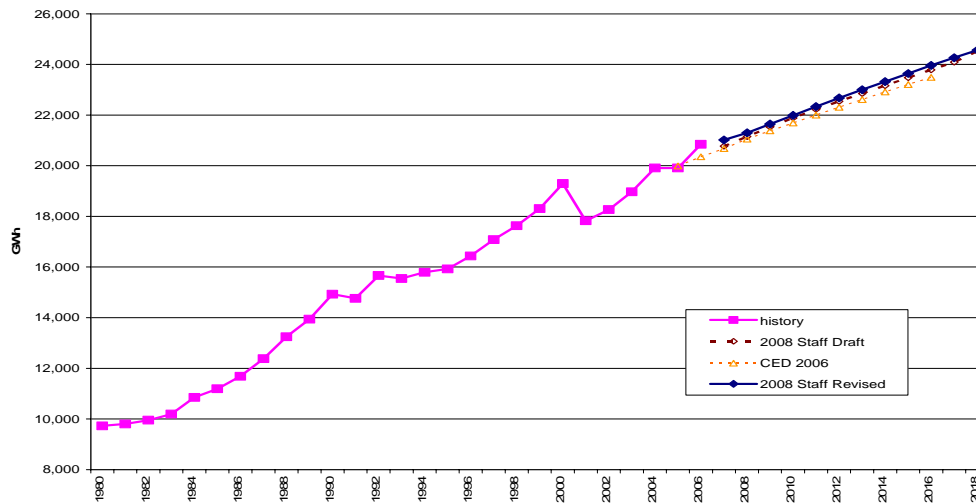
Table 22: SDG&E Planning Area Peak Forecast Comparison

Peak (MW)					
	CED 2006	Staff Draft	Staff Revised	Percent Difference Staff Revised/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	2,961	2,949	2,956	-0.17%	0.23%
2000	3,472	3,471	3,476	0.11%	0.13%
2005	4,231	4,052	4,003	-5.40%	-1.22%
2008	4,451	4,578	4,568	2.63%	-0.21%
2013	4,784	4,899	4,925	2.95%	0.52%
2016	4,970	5,084	5,131	3.23%	0.92%
Average Annual Growth Rates					
1990-2000	1.60%	1.64%	1.63%		
2000-2005	4.03%	3.14%	2.86%		
2005-2008	1.70%	4.15%	4.51%		
2008-2016	1.39%	1.32%	1.46%		
Historic values are shaded					

Source: California Energy Commission, 2007.

As shown in **Figure 75**, the revised 2008 forecast is only slightly higher than the draft consumption forecast. Projected growth rates of the forecasts are essentially the same.

Figure 75: SDG&E Planning Area Electricity Forecast

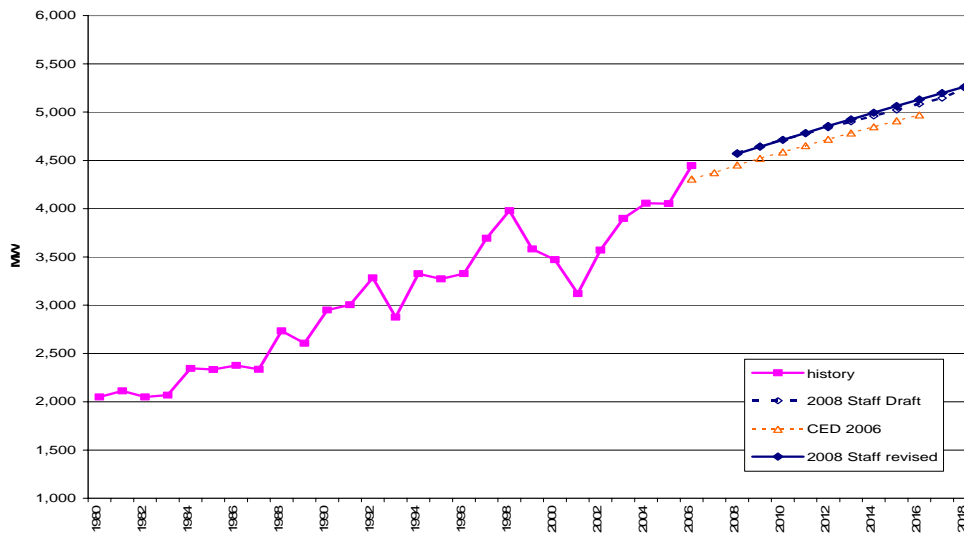


Source: California Energy Commission, 2007.

Figure 76 compares the various peak forecasts. The revised peak demand forecast has a similar growth rate as the draft 2008 forecast. The starting point of the revised

2008 forecast is consistent with the updated 2008 peak forecast adopted in June 2007.

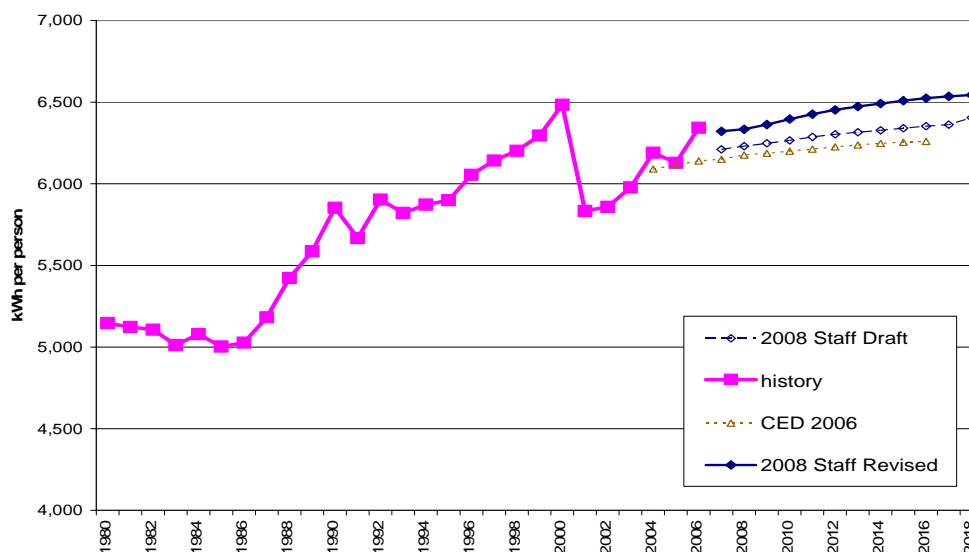
Figure 76: SDG&E Planning Area Peak



Source: California Energy Commission, 2007.

Figure 77 compares forecasted per capita residential electricity consumption. Per capita consumption in the revised 2008 forecast is higher than in the draft forecast because of upward revisions to historic consumption estimates and higher projected growth in per capita income.

Figure 77: SDG&E Planning Area per Capita Electricity Consumption

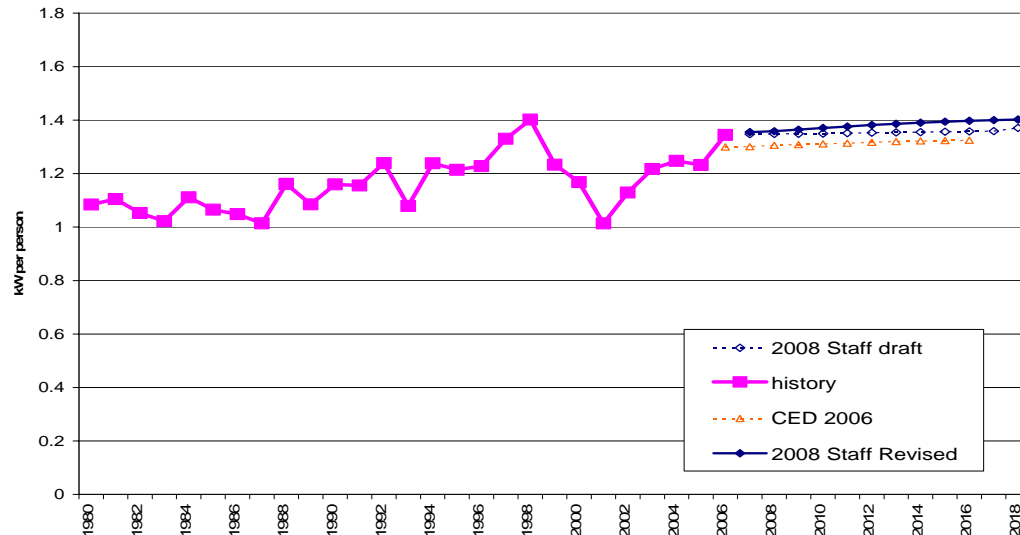


Source: California Energy Commission, 2007.

Revised per capita peak demand, shown in **Figure 78**, grows at a slightly greater rate than in the draft 2008 forecast. This is caused by both a change in the mix of

nonresidential sector consumption projections and an increase in the growth of per capita income over the forecast period. The projections of per capita peak demand still remain below pre-electricity crisis levels until the end of the forecast period.

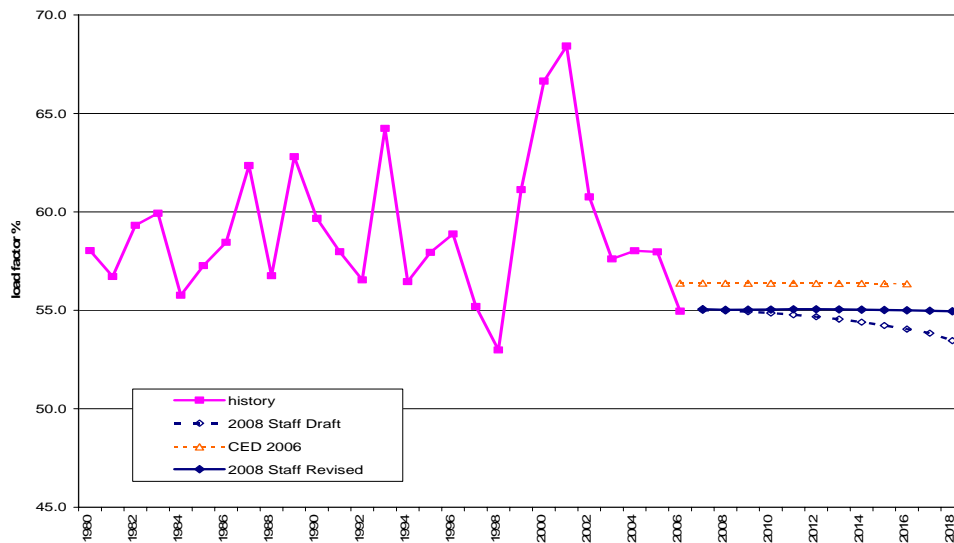
Figure 78: SDG&E Planning Area per Capita Peak Demand



Source: California Energy Commission, 2007.

Figure 79 provides a comparison of the respective forecast load factors. High load factors observed from 1998 to 2005 are a product of lower-than-average temperatures reducing peaks compared with what would have been expected, and a reaction to the energy crisis when consumers voluntarily reduced their air conditioning usage. The projected load factor, based on higher, 1-in-2 peak temperatures and a return to normal air conditioning use patterns, should be lower than these recent values. The forecasted load factor is relatively constant at the lower end of the historic spectrum, reflecting an increase in air conditioning use in the SDG&E territory.

Figure 79: SDG&E Planning Area Peak Load Factor



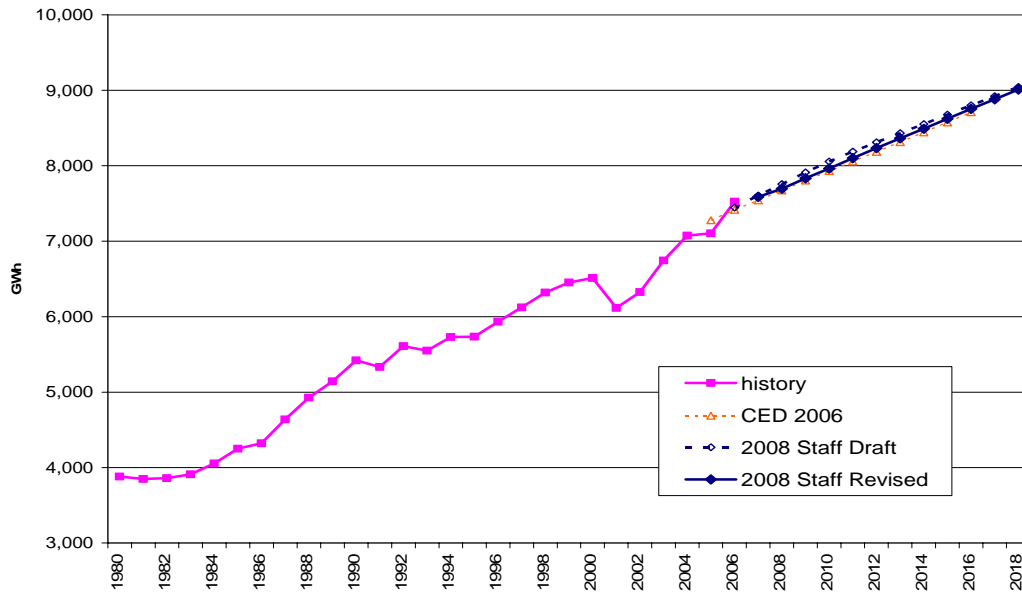
Source: California Energy Commission, 2007.

Sector Level Results and Input Assumptions

Residential

Figure 80 provides comparisons of the residential electricity forecasts. The revised 2008 forecast is slightly lower than the draft 2008 forecast and slightly higher than the *CED 2006* forecast. These differences are caused by incorporation of the new DOF long-term population forecast for the SDG&E planning area. The new population forecast is slightly lower than the one used in both previous forecasts. However, the lower population forecast is partially offset by faster growth in the revised household income forecast. The draft forecast used Dec. 2006 economic projections from Economy.com; the revised forecast uses their May 2007 projections.

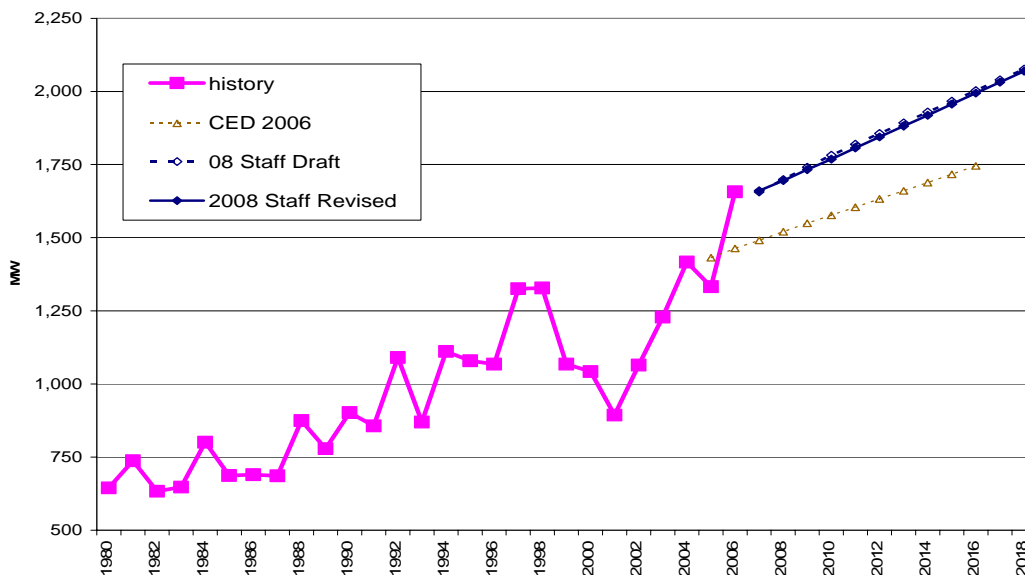
Figure 80: SDG&E Planning Area Residential Consumption



Source: California Energy Commission, 2007.

Figure 81 compares the revised 2008 residential peak demand forecasts with both the draft 2008 and *CED 2006* forecasts. The differences in the respective electricity forecasts drive differences between the revised and draft 2008 forecasts.

Figure 81: SDG&E Planning Area Residential Peak

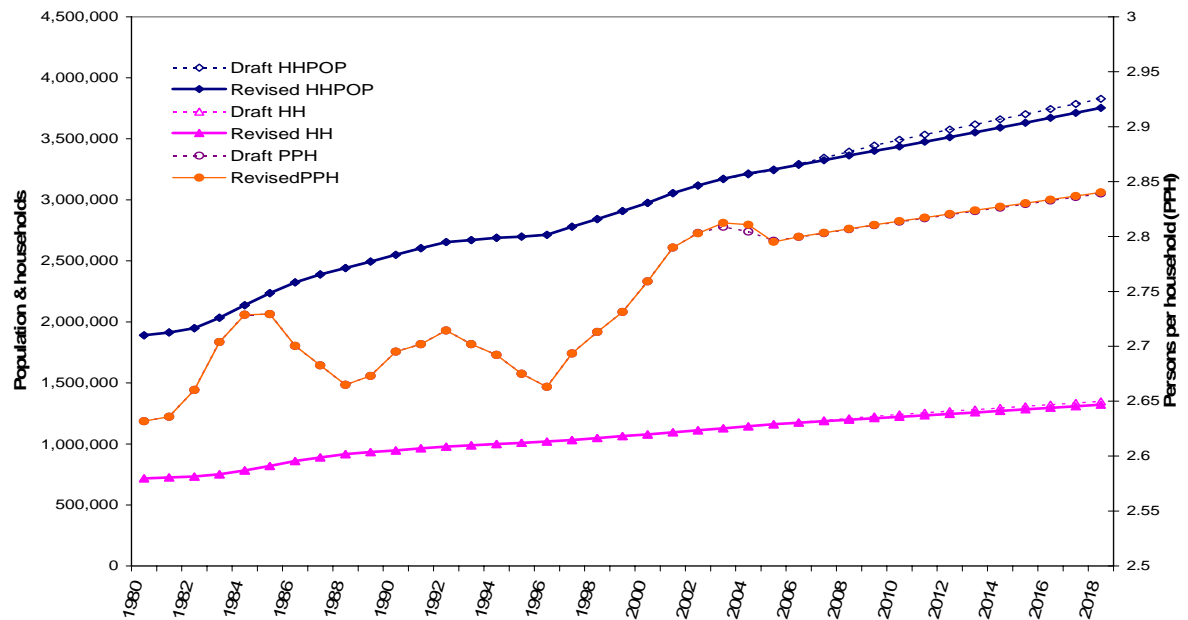


Source: California Energy Commission, 2007.

Figures 82 and 83 provide comparisons of the residential drivers used in the 2008 revised forecast with those used in the draft forecast. Figure 82 provides comparisons of total population, total households, and persons per household

projections. The revised 2008 forecast of total population is slightly lower than the draft 2008 forecast. This produces a slightly lower revised household forecast.

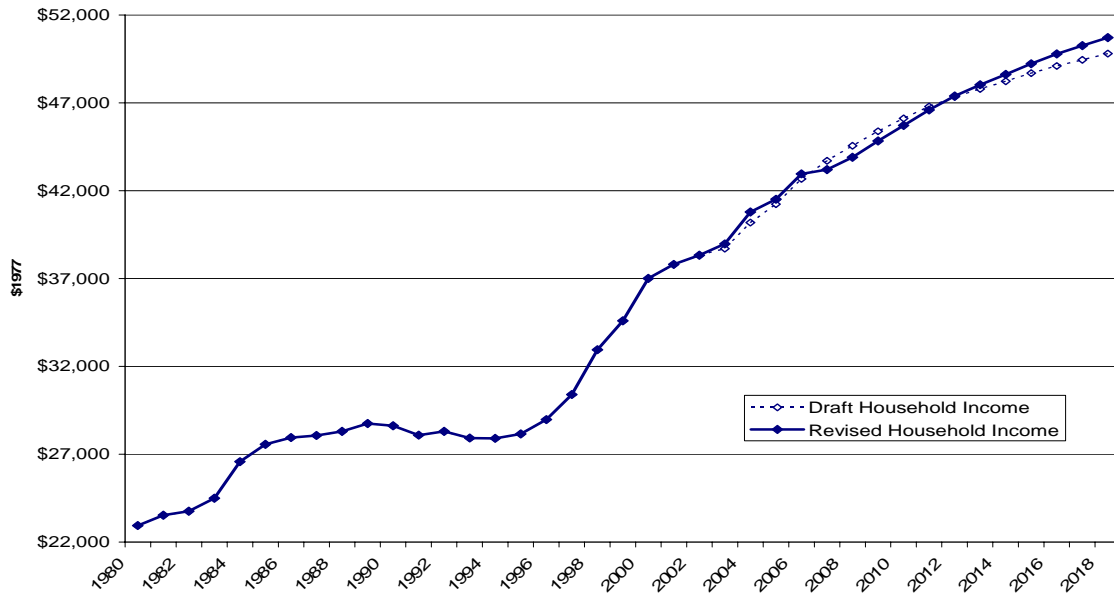
Figure 82: SDG&E Planning Area Residential Demographic Projections



Source: California Energy Commission, 2007.

Figure 83 provides a comparison of household income projections used in the revised 2008 with those used in the draft 2008 forecast. The revised 2008 projection, using a May 2007 Economy.com projection, is lower in the short term, but grows at a faster rate over the forecast period than the December 2006 projection used in the draft 2008 forecast.

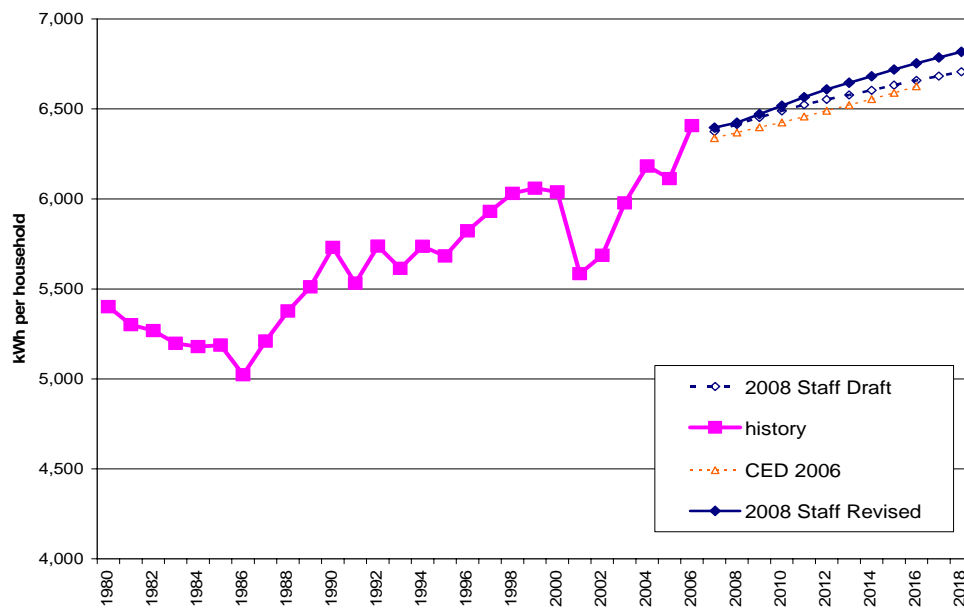
Figure 83: SDG&E Planning Area Household Income Projections



Source: California Energy Commission, 2007.

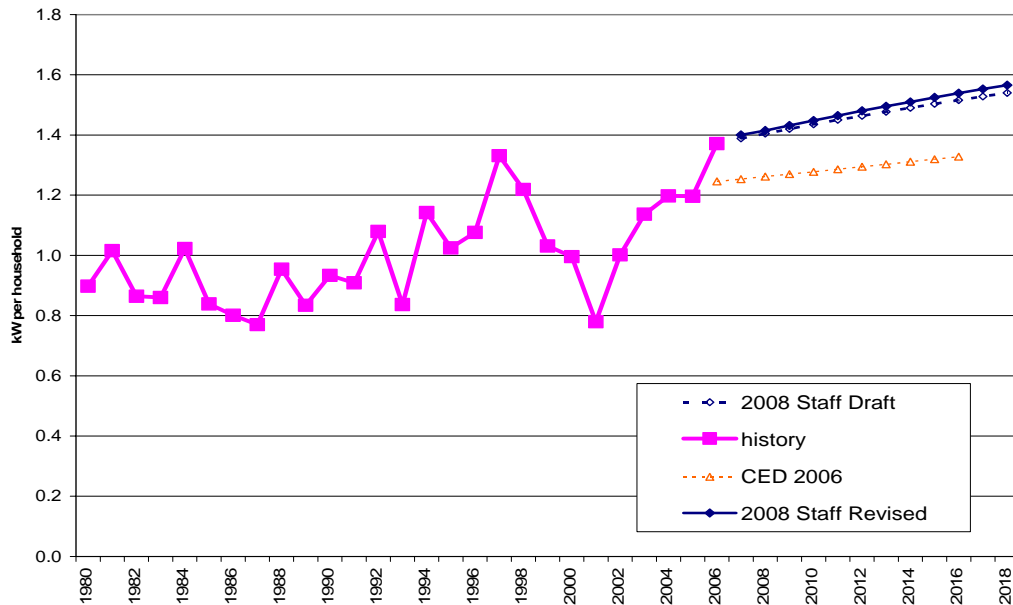
Figures 84 and 85 present comparisons of use per household between the forecasts. Figure 84 is a comparison of annual electricity use per household, and Figure 85 is a comparison of peak demand per household. Both the electricity and peak revised 2008 forecasts of use per household are slightly higher than the draft 2008 projections, primarily because of higher household income growth projections.

Figure 84: SDG&E Planning Area Use per Household



Source: California Energy Commission, 2007.

Figure 85: SDG&E Planning Area Peak Use per Household

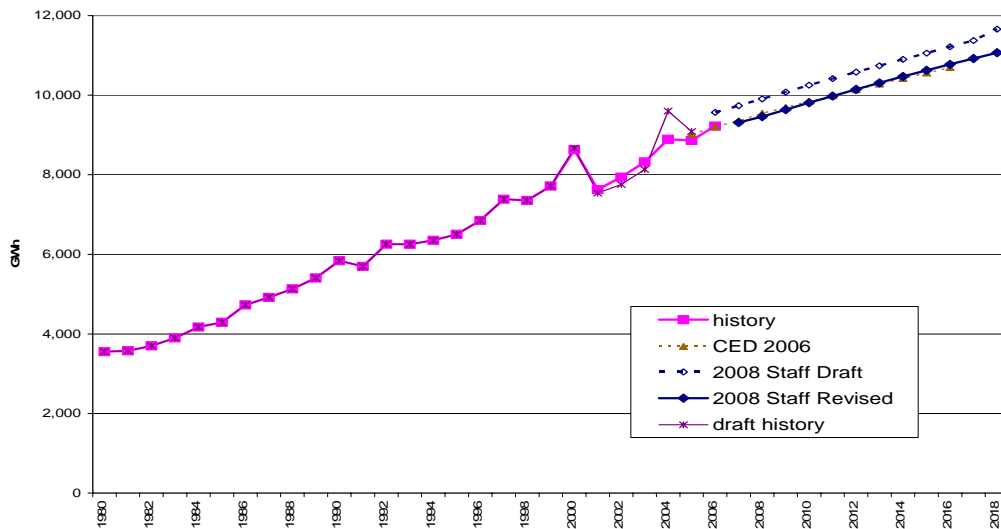


Source: California Energy Commission, 2007.

Commercial Building Sector

Figures 86 and 87 provide a comparison of the commercial building sector forecasts. The revised 2008 forecast is lower than the draft 2008 forecast. This difference is caused by lower estimates of historic consumption, provided by SDG&E, of both commercial retail sales and self generation. The forecasted growth rates of the forecasts are essentially the same.

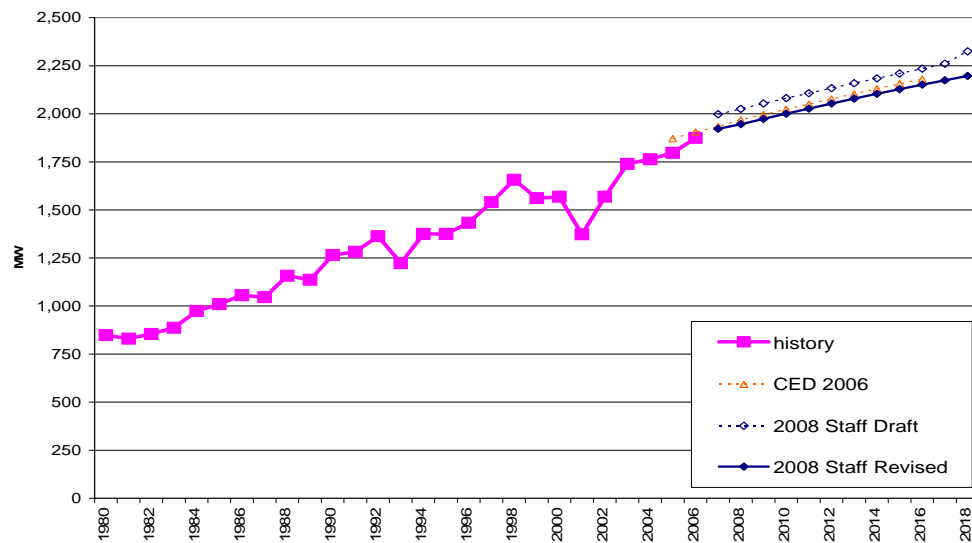
Figure 86: SDG&E Planning Area Commercial Consumption



Source: California Energy Commission, 2007.

Figure 87 provides a comparison of the commercial building sector peak demand forecasts. These differences mirror the differences in energy forecasts.

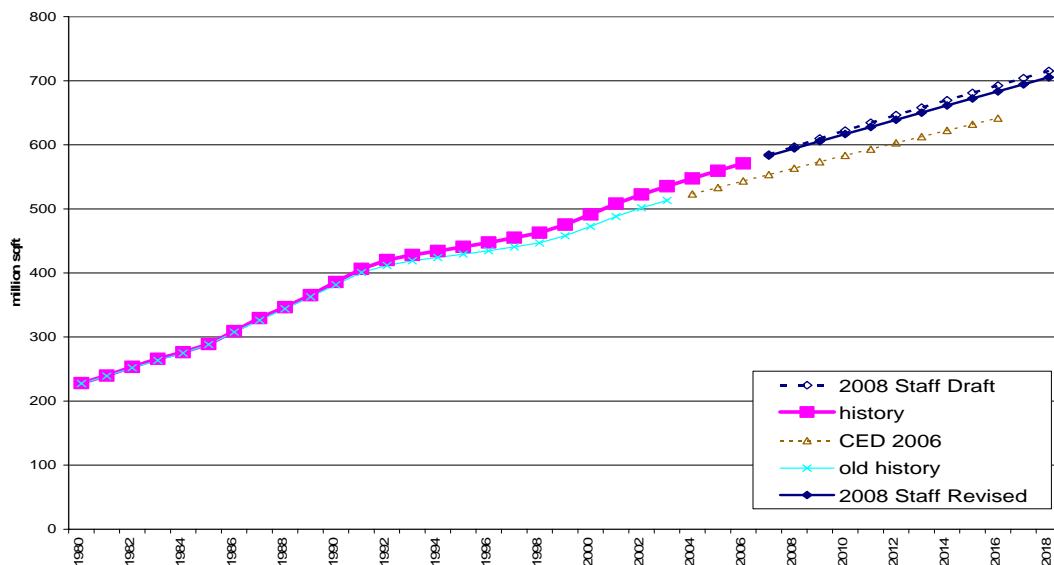
Figure 87: SDG&E Planning Area Commercial Sector Peak



Source: California Energy Commission, 2007.

In staff's commercial building sector forecasting model, projected floor space by building type, such as retail, schools and offices, is the key driver of forecasted energy use. **Figure 88** provides a comparison of total commercial floor space projections. The revised 2008 floor space forecast is slightly lower than the draft 2008 forecast, primarily because of the lower population forecast.

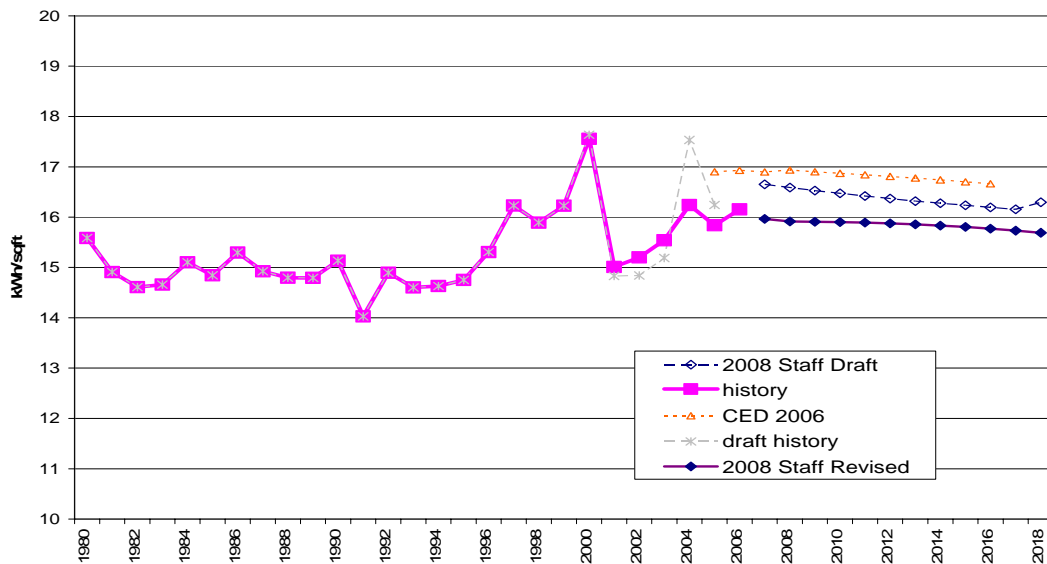
Figure 88: SDG&E Planning Area Commercial Floor Space



Source: California Energy Commission, 2007.

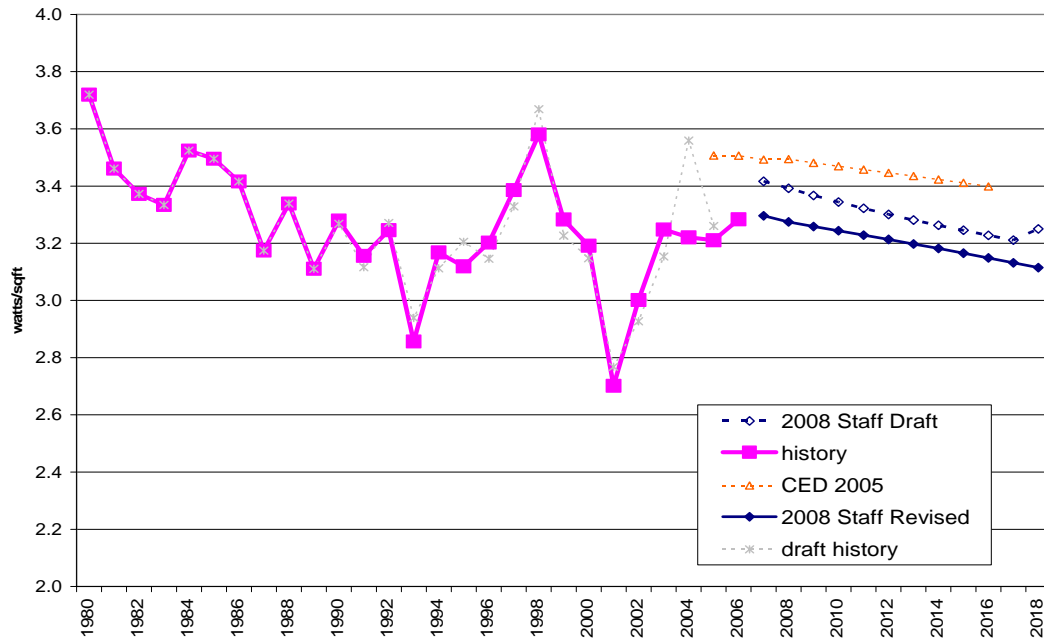
Figures 89 and 90 show historic and projected commercial sector annual and peak use per square foot, respectively. The lower values seen in the revised 2008 forecasts are related to changes in historic commercial consumption estimates described previously. The revised 2008 annual use per square foot forecast, shown in Figure 89, is projected to decline at a slower rate than the draft 2008 forecast. However, the revised 2008 forecast of commercial peak use per square foot, shown in Figure 90, is projected to decline at a similar rate to the draft 2008 forecast. The energy and peak forecasts of use per square foot decline over the forecast period because of projected impacts of commercial building and appliance standards considered to be committed.

Figure 89: SDG&E Planning Area Commercial kWh per Square Foot



Source: California Energy Commission, 2007.

Figure 90: SDG&E Planning Area Commercial Watts per Square Foot



Source: California Energy Commission, 2007.

Industrial Sector

Figure 91 provides a comparison of the industrial sector electricity consumption forecasts for the SDG&E planning area. The revised 2008 forecast is lower throughout the entire forecast period than the draft 2008 forecast. This is caused by a lower 2006 starting point and revised estimates of energy intensity trends.

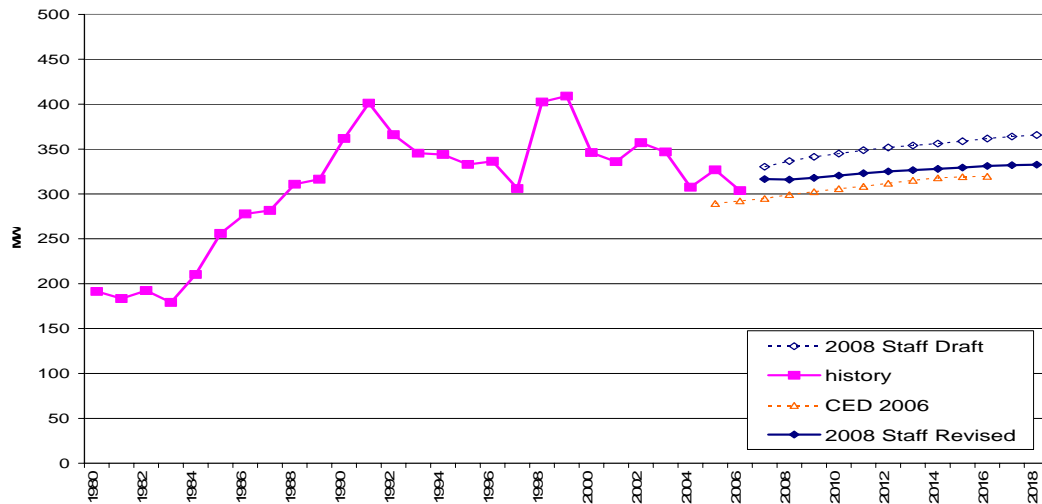
Figure 91: SDG&E Planning Area Industrial Consumption



Source: California Energy Commission, 2007.

Figure 92 provides a comparison of the industrial sector peak forecasts. The peak forecast differences are driven by differences in the electricity consumption forecasts. As was the case for industrial sector consumption, the revised 2008 projected growth rate of peak demand is slightly lower than that projected in the draft 2008 forecast.

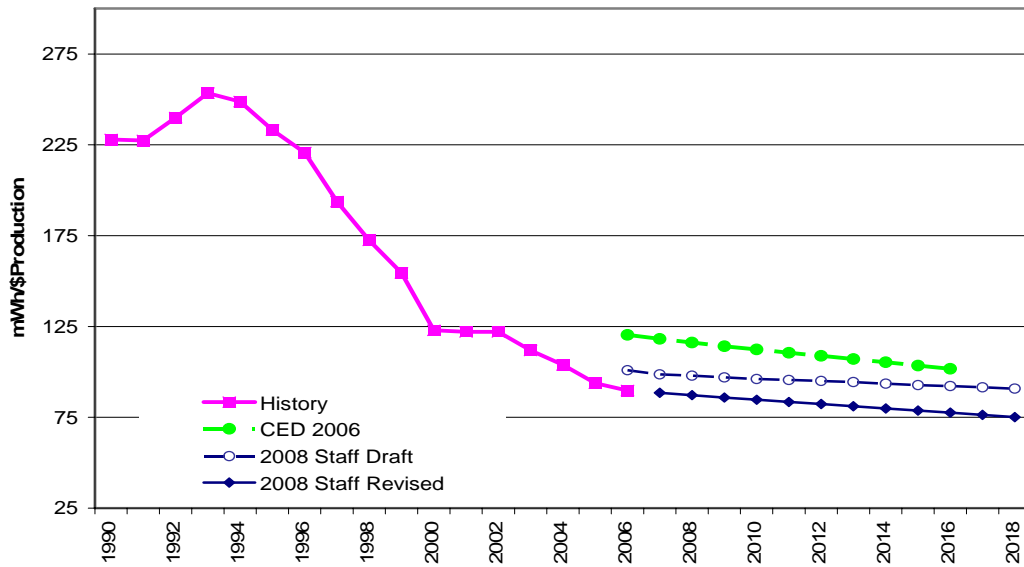
Figure 92: SDG&E Planning Area Industrial Sector Peak



Source: California Energy Commission, 2007.

Figure 93 provides a comparison of use per dollar value of production between the forecasts. The difference in kWh per dollar of industrial value added in the forecasts is caused by different estimated starting points. The revised 2008 forecast of use per dollar of value added declines at a slightly faster rate than the draft 2008 forecast. Staff reviewed the historic energy use trends and revised the forecast model assumptions to be more consistent with observed patterns of declining use per dollar of production.

Figure 93: SDG&E Planning Area Industrial Use per Production Unit



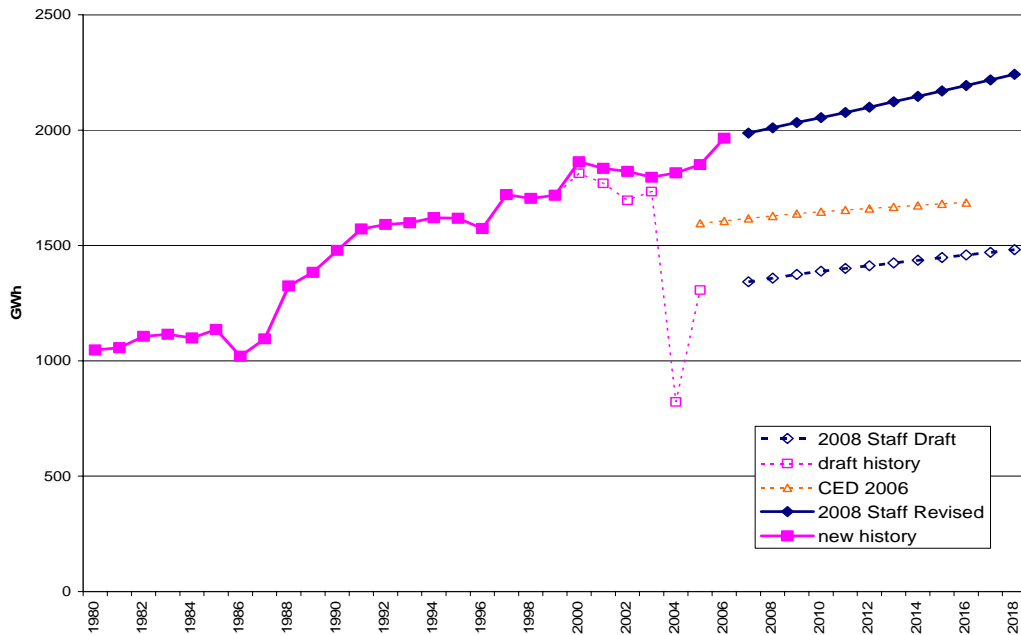
Source: California Energy Commission, 2007.

Other Sectors

Figures 94 and 95 provide comparisons of the remaining sector electricity consumption forecasts. Figure 94 provides a comparison of the transportation, communication and utilities (TCU) sector forecasts. The revised 2008 forecast is higher than the draft 2008 forecast due to reallocation of additional historic consumption to the TCU sector based on estimates from SDG&E.

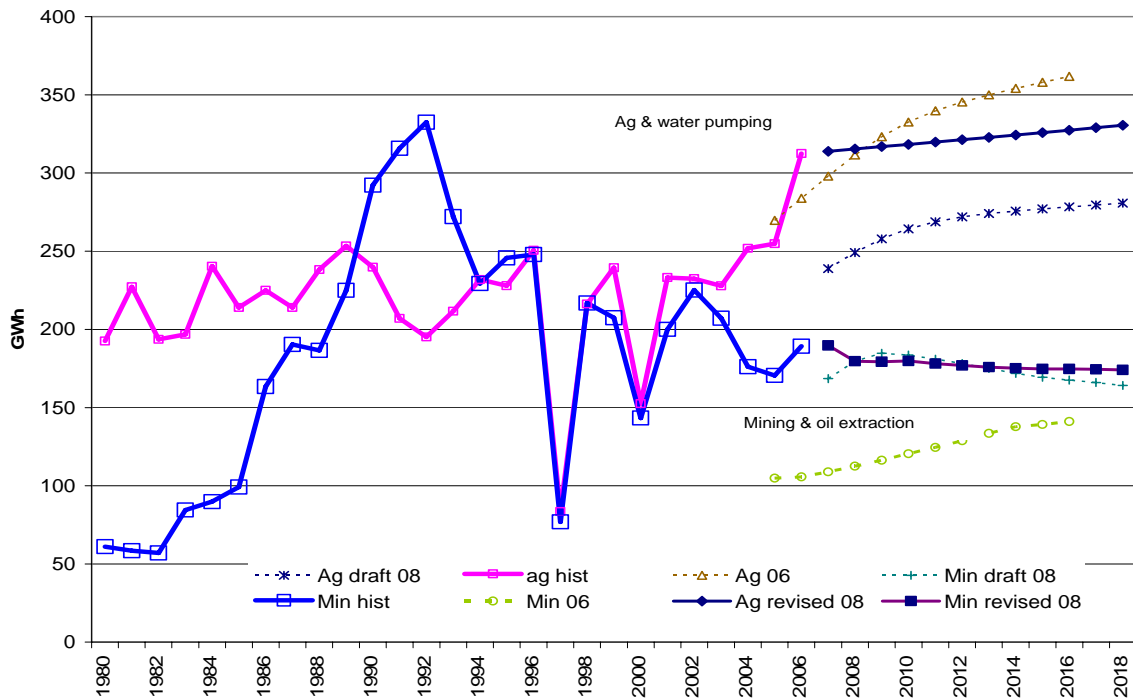
Figure 95 provides comparisons of the agriculture and water pumping and mining and oil extraction sector forecasts. The revised agriculture and water pumping forecast is lower than the *CED 2006* because of higher projected electricity rates. The revised mining and oil extraction forecast has a higher starting point because of changes in the unclassified consumption distribution. The lower growth rate of the revised forecast compared to *CED 2006* reflects the pattern of Economy.com's forecast of mining sector employment, which is used as the forecast driver.

Figure 94: SDG&E Planning Area Transportation, Communication, and Utilities Sector Electricity Consumption



Source: California Energy Commission, 2007.

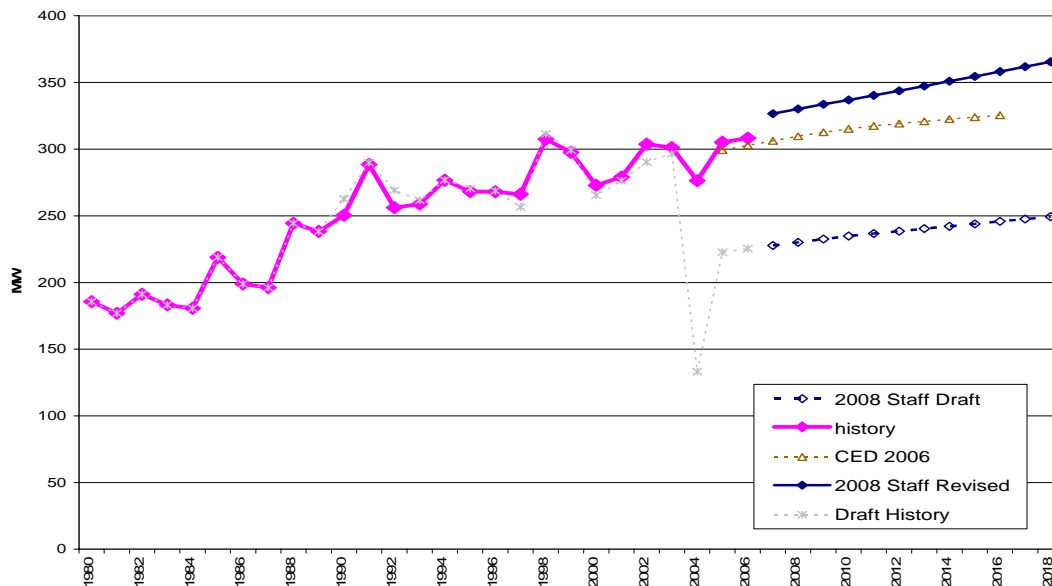
Figure 95: SDG&E Planning Area Agriculture & Water Pumping and Mining & Oil Extraction Electricity Consumption Forecasts



Source: California Energy Commission, 2007.

Figure 96 provides a comparison of the combined Other Sector peaks for the draft and revised 2008 forecasts and *CED 2006* forecast. The revised 2008 forecast starts at a higher level than the draft forecast, as does the consumption forecast, because of revised historic consumption data. Both forecasts have a similar growth rate.

Figure 96: SDG&E Planning Area Other Sector Peak



Source: California Energy Commission, 2007.

Electricity Prices

As in the draft forecast, the revised 2008 forecast used prices which are held constant (in real terms) at the 2005 level for all sectors. This is in contrast to the declining price forecast that was used in the *CED 2006* price forecast.

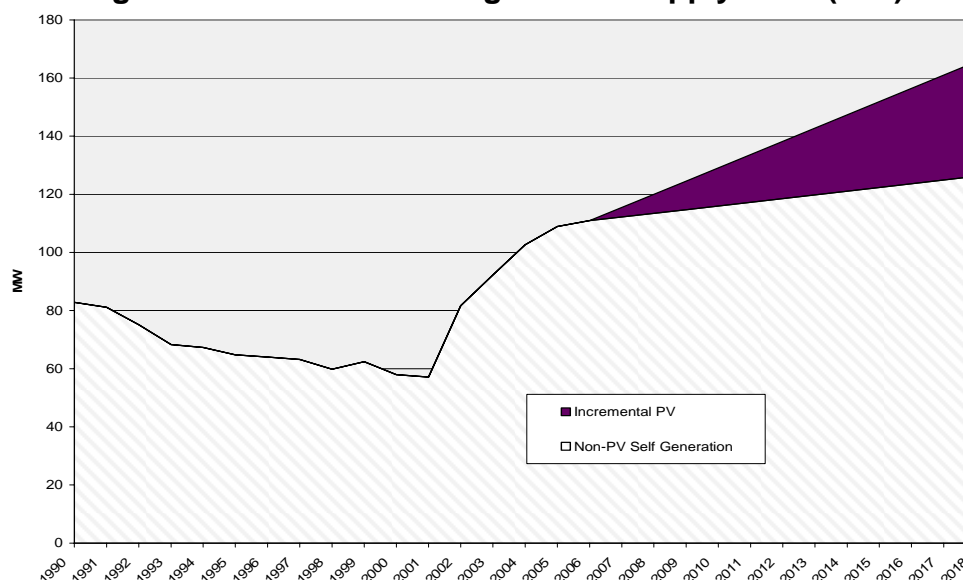
Self-Generation

As discussed in Chapter 1, the peak demand forecast is reduced by staff's estimate of the effects of the Self-Generation Incentive Program and California Solar Initiative programs. Both programs are forecast based on the recent trend of installations.

Figure 97 shows the resulting forecast of cumulative peak impacts. Annual impacts are reported as "Private Supply" in Forms 1.2 and 1.4 following this chapter.

Because the actual energy consumption and coincident peak impacts of PV are not reported to the Energy Commission, and therefore are not included in the consumption forecast, only the incremental impacts of new PV installations are forecast and subtracted from the peak demand forecast.

Figure 97: SDG&E Planning Private Supply Peak (MW)



Source: California Energy Commission, 2007.

Conservation Savings Embedded in the Forecast

Savings from all building and appliance standards adopted through 2005 are accounted for in the Energy Commission residential and commercial demand forecast models. Savings from public agency and utility programs funded through 2008 are also included. However, there may be some overlap with effects embedded in the demand forecast with uncommitted program impacts; see Chapter 1 for a discussion of this issue. To determine the magnitude of these savings, the models are run without these programs in effect (in the chronological order of the programs' occurrence). The savings are then calculated by subtracting the results of the run with the program in effect from the results without the program in effect. A condensed version of the results of this analysis is presented here as an estimate of savings which are accounted for in the baseline forecast. Additional detail is shown in the tables at the end of this chapter. **Table 23** presents electricity consumption savings, by broad program category, for selected years. **Table 24** presents similar estimates of peak savings.

Table 23: SDG&E Planning Area Electricity Conservation Savings Estimates

	1990	2000	2005	2008	2013	2018
Residential Energy Savings (GWH)						
Building Standards	85	166	208	253	322	387
Appliance Standards	270	636	807	885	1002	1108
Utility and Public Agency Programs	28	19	51	73	73	75
Market and Price Effects	168	288	300	300	300	300
Total Residential Savings	551	1110	1365	1510	1698	1869
Commercial Energy Savings (GWH)						
Building Standards	158	437	687	857	1160	1480
Appliance Standards	99	268	399	487	636	785
Utility and Public Agency Programs	68	287	302	364	356	349
Market and Price Effects	645	524	620	621	693	740
Total Commercial Savings	970	1516	2007	2329	2845	3354
Total Energy Savings	1521	2625	3373	3839	4543	5223

Source: California Energy Commission, 2007.

Table 24: SDG&E Planning Area Peak Conservation Savings Estimates

	1990	2000	2005	2008	2013	2018
Residential Energy Savings (MW)						
Building Standards	53	102	128	145	169	191
Appliance Standards	35	83	105	115	130	144
Utility and Public Agency Programs	9	6	19	27	27	28
Market and Price Effects	39	66	69	69	69	69
Total Residential Savings	136	258	321	357	396	432
Commercial Energy Savings (GWH)						
Building Standards	36	101	158	197	267	340
Appliance Standards	23	62	92	112	146	181
Utility and Public Agency Programs	13	55	57	69	68	67
Market and Price Effects	148	120	143	143	159	170
Total Commercial Savings	221	337	450	521	640	758
Total Energy Savings	356	595	771	878	1036	1190

Source: California Energy Commission, 2007.

Form 1.1 - SDG&E Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Electricity Consumption by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1980	3,879	3,555	994	61	193	955	92	9,729
1981	3,848	3,577	1,037	58	227	968	89	9,804
1982	3,858	3,701	1,035	57	194	1,024	82	9,950
1983	3,909	3,900	987	85	197	1,038	77	10,192
1984	4,056	4,174	1,195	90	240	1,021	78	10,854
1985	4,249	4,291	1,199	99	214	1,058	77	11,187
1986	4,323	4,728	1,224	163	225	944	76	11,684
1987	4,638	4,917	1,322	190	214	1,019	77	12,377
1988	4,928	5,130	1,440	187	238	1,250	74	13,246
1989	5,144	5,406	1,527	225	253	1,311	73	13,939
1990	5,421	5,841	1,653	292	240	1,405	73	14,926
1991	5,333	5,698	1,640	316	207	1,495	76	14,764
1992	5,609	6,257	1,680	332	195	1,515	76	15,665
1993	5,549	6,253	1,665	272	212	1,521	77	15,549
1994	5,729	6,352	1,628	229	232	1,542	79	15,791
1995	5,734	6,503	1,595	246	228	1,537	81	15,923
1996	5,935	6,850	1,581	248	251	1,491	82	16,437
1997	6,123	7,384	1,694	77	84	1,637	83	17,082
1998	6,319	7,355	1,819	217	216	1,611	93	17,630
1999	6,453	7,716	1,979	207	239	1,624	93	18,312
2000	6,513	8,628	1,995	143	153	1,767	96	19,294
2001	6,116	7,629	1,813	200	233	1,736	98	17,825
2002	6,326	7,942	1,721	225	232	1,725	96	18,267
2003	6,745	8,322	1,671	207	228	1,691	105	18,968
2004	7,074	8,892	1,699	176	252	1,713	102	19,908
2005	7,105	8,863	1,667	170	255	1,746	105	19,910
2006	7,522	9,222	1,641	189	312	1,857	108	20,851
2007	7,586	9,312	1,630	190	314	1,879	109	21,019
2008	7,697	9,460	1,641	180	315	1,900	110	21,304
2009	7,833	9,634	1,653	179	317	1,922	111	21,650
2010	7,962	9,808	1,668	180	318	1,942	112	21,991
2011	8,099	9,977	1,685	178	320	1,964	113	22,337
2012	8,235	10,146	1,699	177	321	1,986	114	22,677
2013	8,363	10,310	1,708	176	323	2,008	115	23,002
2014	8,490	10,470	1,716	175	324	2,030	116	23,322
2015	8,622	10,625	1,725	175	326	2,052	118	23,643
2016	8,753	10,775	1,736	175	327	2,075	119	23,960
2017	8,881	10,923	1,741	174	329	2,098	120	24,265
2018	9,010	11,067	1,743	174	331	2,121	121	24,567

Annual Growth Rates (%)

1980-1990	3.4	5.1	5.2	16.9	2.2	3.9	-2.2	4.4
1990-2000	1.9	4.0	1.9	-6.9	-4.4	2.3	2.7	2.6
2000-2006	2.4	1.1	-3.2	4.7	12.7	0.8	1.9	1.3
2006-2011	1.5	1.6	0.5	-1.2	0.5	1.1	1.0	1.4
2011-2018	1.5	1.5	0.5	-0.3	0.5	1.1	1.0	1.4
2006-2018	1.5	1.5	0.5	-0.7	0.5	1.1	1.0	1.4

Form 1.1b - SDG&E Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Electricity Sales by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1980	3,879	3,555	994	61	193	955	92	9,729
1981	3,848	3,577	1,037	58	227	968	89	9,804
1982	3,858	3,695	1,028	57	194	1,024	82	9,938
1983	3,909	3,867	967	85	194	1,038	77	10,136
1984	4,056	4,118	1,131	90	238	991	78	10,701
1985	4,249	4,193	1,115	99	212	983	77	10,928
1986	4,323	4,603	1,109	163	225	861	76	11,360
1987	4,638	4,751	1,125	190	214	923	77	11,918
1988	4,927	4,924	1,191	187	238	1,148	74	12,690
1989	5,144	5,221	1,278	225	253	1,195	73	13,388
1990	5,421	5,663	1,424	292	239	1,284	73	14,397
1991	5,333	5,536	1,406	316	206	1,373	76	14,246
1992	5,609	6,112	1,456	332	195	1,404	76	15,184
1993	5,549	6,107	1,463	272	211	1,433	77	15,112
1994	5,729	6,201	1,441	229	232	1,450	79	15,361
1995	5,734	6,354	1,414	246	228	1,453	81	15,509
1996	5,935	6,701	1,400	248	251	1,412	82	16,028
1997	6,123	7,234	1,522	77	84	1,556	83	16,678
1998	6,319	7,212	1,658	217	216	1,533	93	17,247
1999	6,453	7,570	1,807	207	239	1,543	93	17,913
2000	6,513	8,489	1,843	143	153	1,687	96	18,924
2001	6,116	7,488	1,697	200	233	1,627	98	17,459
2002	6,326	7,700	1,592	225	232	1,574	96	17,745
2003	6,745	7,993	1,516	207	228	1,584	105	18,378
2004	7,074	8,528	1,543	176	252	1,577	102	19,252
2005	7,105	8,499	1,504	170	255	1,575	105	19,213
2006	7,522	8,862	1,484	189	312	1,664	108	20,141
2007	7,585	8,941	1,472	190	314	1,683	109	20,293
2008	7,694	9,078	1,481	180	315	1,703	110	20,561
2009	7,829	9,240	1,491	179	317	1,722	111	20,890
2010	7,957	9,402	1,505	180	318	1,740	112	21,214
2011	8,093	9,559	1,520	178	320	1,760	113	21,542
2012	8,226	9,715	1,532	177	321	1,779	114	21,865
2013	8,353	9,868	1,539	176	323	1,799	115	22,173
2014	8,480	10,016	1,546	175	324	1,819	116	22,476
2015	8,610	10,159	1,553	175	326	1,839	118	22,779
2016	8,740	10,298	1,562	175	327	1,859	119	23,080
2017	8,866	10,434	1,565	174	329	1,880	120	23,368
2018	8,994	10,566	1,565	174	331	1,901	121	23,652

Annual Growth Rates (%)

1980-1990	3.4	4.8	3.7	16.9	2.2	3.0	-2.2	4.0
1990-2000	1.9	4.1	2.6	-6.9	-4.4	2.8	2.7	2.8
2000-2006	2.4	0.7	-3.5	4.7	12.7	-0.2	1.9	1.0
2006-2011	1.5	1.5	0.5	-1.2	0.5	1.1	1.0	1.4
2011-2018	1.5	1.4	0.4	-0.3	0.5	1.1	1.0	1.3
2006-2018	1.5	1.5	0.4	-0.7	0.5	1.1	1.0	1.3

Form 1.2 - SDGE
California Energy Demand 2008-2018 Staff Revised Forecast
Net Energy for Load (GWh)

Year	Total Consumption	Net Losses	Gross Generation	Non-PV Self Generation	Incremental PV	Total Private Supply	Net Energy for Load
1990	14,926	1,021	15,947	529	0	529	15,418
1991	14,764	1,010	15,774	519	0	519	15,256
1992	15,665	1,077	16,741	480	0	480	16,261
1993	15,549	1,071	16,620	436	0	436	16,184
1994	15,791	1,089	16,880	430	0	430	16,450
1995	15,923	1,100	17,023	414	0	414	16,609
1996	16,437	1,136	17,573	409	0	409	17,164
1997	17,082	1,182	18,264	404	0	404	17,860
1998	17,630	1,223	18,853	383	0	383	18,470
1999	18,312	1,270	19,582	399	0	399	19,183
2000	19,294	1,342	20,636	370	0	370	20,265
2001	17,825	1,238	19,063	365	0	365	18,697
2002	18,267	1,258	19,525	522	0	522	19,003
2003	18,968	1,303	20,271	590	0	590	19,681
2004	19,908	1,365	21,273	657	0	657	20,617
2005	19,910	1,362	21,272	697	0	697	20,576
2006	20,851	1,428	22,279	710	0	710	21,569
2007	21,019	1,439	22,458	717	9	726	21,733
2008	21,304	1,459	22,763	725	18	743	22,020
2009	21,650	1,483	23,133	733	27	760	22,373
2010	21,991	1,507	23,498	741	36	777	22,721
2011	22,337	1,531	23,867	749	45	795	23,073
2012	22,677	1,554	24,231	757	54	812	23,419
2013	23,002	1,577	24,579	766	63	829	23,750
2014	23,322	1,599	24,921	774	73	846	24,074
2015	23,643	1,621	25,264	782	82	863	24,400
2016	23,960	1,643	25,603	790	91	881	24,722
2017	24,265	1,664	25,929	798	100	898	25,032
2018	24,567	1,685	26,252	806	109	915	25,337

Annual Growth Rates (%)

1990-2000	2.6	2.8	2.6	-3.5		-3.5	2.8
2000-2006	1.3	1.0	1.3	11.5		11.5	1.0
2006-2011	1.4	1.4	1.4	1.1		2.3	1.4
2011-2018	1.4	1.4	1.4	1.1	13.3	2.0	1.3
2006-2018	1.4	1.4	1.4	1.1		2.1	1.4

Form 1.3 - SDG&E Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Coincident Peak Demand by Sector (MW)

Year	Residential	Commercial	Industrial	Agricultural	Other	Total Demand
1980	645	848	191	24	161	1,870
1981	737	830	183	26	151	1,928
1982	633	854	192	24	167	1,871
1983	647	887	179	24	160	1,896
1984	801	974	210	27	154	2,166
1985	687	1,010	256	28	191	2,172
1986	689	1,056	278	29	169	2,222
1987	686	1,046	282	26	170	2,209
1988	874	1,157	311	30	214	2,587
1989	779	1,137	316	29	209	2,470
1990	902	1,266	362	27	223	2,780
1991	856	1,282	401	27	262	2,828
1992	1,091	1,363	366	21	235	3,076
1993	870	1,223	345	24	235	2,697
1994	1,111	1,375	344	28	249	3,107
1995	1,079	1,375	333	27	241	3,055
1996	1,068	1,433	336	30	238	3,105
1997	1,326	1,540	306	21	245	3,438
1998	1,328	1,657	402	28	280	3,695
1999	1,068	1,561	409	29	268	3,335
2000	1,042	1,568	346	19	254	3,230
2001	894	1,373	336	25	254	2,882
2002	1,064	1,568	357	27	277	3,294
2003	1,229	1,739	347	26	275	3,616
2004	1,416	1,763	308	26	250	3,764
2005	1,332	1,797	327	28	277	3,761
2006	1,657	1,874	304	33	275	4,143
2007	1,661	1,922	317	35	292	4,226
2008	1,695	1,946	316	35	295	4,288
2009	1,733	1,974	318	35	299	4,358
2010	1,769	2,001	321	35	302	4,427
2011	1,807	2,027	323	35	305	4,497
2012	1,845	2,053	325	35	308	4,567
2013	1,881	2,079	327	35	312	4,634
2014	1,919	2,104	328	36	315	4,701
2015	1,957	2,128	329	36	319	4,769
2016	1,994	2,151	331	36	322	4,835
2017	2,032	2,174	332	36	326	4,900
2018	2,069	2,197	333	36	329	4,964

Annual Growth Rates (%)

1980-1990	3.4	4.1	6.6	1.1	3.3	4.0
1990-2000	1.5	2.2	-0.4	-3.5	1.3	1.5
2000-2006	8.0	3.0	-2.2	9.7	1.3	4.2
2006-2011	1.7	1.6	1.2	1.3	2.1	1.7
2011-2018	2.0	1.2	0.4	0.3	1.1	1.4
2006-2018	1.9	1.3	0.8	0.7	1.5	1.5

Form 1.4 - SDG&E Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Peak Demand (MW)

Year	Total End Use Load	Net Losses	Gross Generation	Non-PV Self Generation	Incremental PV	Total Private Supply	Net Peak Demand	Load Factor (%)
1980	1,870	180	2,050	0	0	0	2,050	58
1981	1,928	185	2,113	0	0	0	2,113	56.7
1982	1,871	179	2,050	2	0	2	2,048	59.4
1983	1,896	181	2,077	9	0	9	2,068	60.2
1984	2,166	206	2,372	24	0	24	2,348	56.5
1985	2,172	205	2,377	41	0	41	2,336	58.5
1986	2,222	208	2,430	51	0	51	2,380	60.0
1987	2,209	205	2,414	72	0	72	2,342	64.6
1988	2,587	240	2,827	87	0	87	2,740	59.1
1989	2,470	229	2,699	86	0	86	2,613	65.2
1990	2,780	259	3,039	83	0	83	2,956	59.5
1991	2,828	264	3,092	81	0	81	3,011	57.8
1992	3,076	288	3,364	75	0	75	3,289	56.4
1993	2,697	252	2,949	68	0	68	2,881	64.1
1994	3,107	292	3,399	67	0	67	3,332	56.4
1995	3,055	287	3,342	65	0	65	3,277	57.9
1996	3,105	292	3,397	64	0	64	3,333	58.8
1997	3,438	324	3,762	63	0	63	3,699	55.1
1998	3,695	349	4,044	60	0	60	3,984	52.9
1999	3,335	314	3,650	62	0	62	3,587	61.0
2000	3,230	304	3,534	58	0	58	3,476	66.6
2001	2,882	271	3,153	57	0	57	3,096	68.9
2002	3,294	308	3,602	82	0	82	3,520	61.6
2003	3,616	338	3,954	92	0	92	3,862	58.2
2004	3,764	351	4,115	103	0	103	4,012	58.7
2005	3,761	351	4,112	109	0	109	4,003	58.7
2006	4,143	387	4,530	111	0	111	4,419	55.7
2007	4,226	395	4,621	112	3	115	4,506	55.1
2008	4,288	401	4,688	113	7	120	4,568	55.0
2009	4,358	407	4,765	115	10	125	4,641	55.0
2010	4,427	414	4,841	116	13	129	4,712	55.0
2011	4,497	420	4,917	117	16	134	4,784	55.1
2012	4,567	427	4,994	119	20	138	4,856	55.1
2013	4,634	433	5,068	120	23	143	4,925	55.1
2014	4,701	440	5,141	121	26	147	4,994	55.0
2015	4,769	446	5,215	122	30	152	5,063	55.0
2016	4,835	452	5,287	124	33	156	5,131	55.0
2017	4,900	458	5,359	125	36	161	5,198	55.0
2018	4,964	464	5,429	126	39	166	5,263	55.0

Annual Growth Rates (%)

1980-1990	4.0	3.7	4.0			3.7	0.3
1990-2000	1.5	1.6	1.5	-3.5		1.6	1.1
2000-2006	4.2	4.1	4.2	11.5		4.1	-2.9
2006-2011	1.7	1.7	1.7	1.1		1.6	-0.2
2011-2018	1.4	1.4	1.4	1.1	13.3	1.4	0.0
2006-2018	1.5	1.5	1.5	1.1		1.5	-0.1

Form 1.5 - SDG&E Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Peak Demand (MW)

Year	1-in-2 Temperatures	1-in-5 Temperatures	1-in-10 Temperatures	1-in-20 Temperatures	1-in-5 Multiplier	1-in-10 Multiplier	1-in-20 Multiplier
2006	4,419	4,720	4,808	5,078	1.068	1.088	1.149
2007	4,506	4,812	4,902	5,177	1.068	1.088	1.149
2008	4,568	4,879	4,970	5,249	1.068	1.088	1.149
2009	4,641	4,956	5,049	5,332	1.068	1.088	1.149
2010	4,712	5,032	5,127	5,414	1.068	1.088	1.149
2011	4,784	5,109	5,205	5,497	1.068	1.088	1.149
2012	4,856	5,186	5,283	5,579	1.068	1.088	1.149
2013	4,925	5,260	5,358	5,659	1.068	1.088	1.149
2014	4,994	5,333	5,433	5,738	1.068	1.088	1.149
2015	5,063	5,407	5,509	5,817	1.068	1.088	1.149
2016	5,131	5,480	5,582	5,895	1.068	1.088	1.149
2017	5,198	5,551	5,655	5,972	1.068	1.088	1.149

CHAPTER 5: Sacramento Municipal Utility District Planning Area

Several alternative configurations of the loads served by various load-serving entities (LSEs) are useful for Northern California. Staff's Sacramento Municipal Utility District (SMUD) planning area includes SMUD retail customers, but does not include the other members of the SMUD control area: Roseville, Redding, Modesto Irrigation District (MID), and some loads served by the Western Area Power Administration (WAPA). To support electricity system analysis, staff derives forecasts by control area and California ISO congestion zone from the planning area and climate zone forecasts. Individual LSE forecasts are prepared using weather-adjusted historic consumption and load data and uses forecasted sector growth rates from the climate zone in which the LSE is located. The LSE forecasts are also adjusted to account for future migrating load or expansion of the LSE's territory. The WAPA, Roseville, Redding, and MID forecasts, included in the PG&E planning area definition, are added to the SMUD control area. Those results are presented in Chapter 1, Table 3, and in Form 1.5. The results in this chapter are for the SMUD planning area only.

This chapter is organized as follows. It first discusses forecasted consumption and peak loads for the SMUD planning area, presenting both total and per capita values. The revised 2008 values are compared with both the draft 2008 forecast and adopted *CED 2006* forecast; differences between forecasts are explained. The forecasted load factor, jointly determined by the consumption and peak load estimates, is also discussed. Second, the chapter presents sector consumption and peak load forecasts. It compares the residential, commercial, industrial and "other" sector staff revised forecasts to previous forecasts and discusses differences among them. Third, the chapter presents the sector electricity prices used as inputs to the staff draft forecast. Fourth, the chapter briefly discusses self generation included in the forecast, and finally presents and discusses estimates of conservation savings embedded in the revised forecast.

Forecast Results

Tables 25 and 26 present comparisons of electricity consumption and peak demand for selected years. The revised 2008 electricity consumption forecast, presented in Table 25, is over 9 percent lower than the draft 2008 forecast by 2016 and 11 percent lower by the end of the forecast period. This is caused by incorporation of the new July 2007 Department of Finance (DOF) long-term population forecast. The new long-term population forecast reduced population estimates for Sacramento County by 15 percent by the end of the forecast period. Clearly this is a major change.

The population decrease mostly affects the residential and commercial sector forecasts, which by 2018 are 13 percent lower in the revised forecast than in the draft. A lower population projection reduces the forecasted demand for services in

the commercial sector, such as grocery stores, retail, and schools, and therefore the commercial floor space forecast is lower. The effect of the population decrease is partially offset by higher persons per household and a higher starting point reflecting higher actual consumption in the industrial, mining, and agriculture and water pumping sectors.

Table 25: SMUD Planning Area Electricity Consumption Forecast Comparison

Consumption (GWH)					
	CED 2006	Staff Draft	Staff Revised	Percent Difference Staff Revised/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	8,358	8,358	8,358	0.00%	0.00%
2000	9,491	9,491	9,491	0.00%	0.00%
2005	10,468	10,523	10,523	0.52%	0.00%
2008	11,178	11,474	11,174	-0.03%	-2.61%
2013	12,566	12,966	12,053	-4.08%	-7.04%
2016	13,435	13,870	12,555	-6.55%	-9.48%
Average Annual Growth Rates					
1990-2000	1.28%	1.28%	1.28%		
2000-2005	1.98%	2.09%	2.09%		
2005-2008	2.21%	2.93%	2.02%		
2008-2016	2.33%	2.40%	1.47%		
Historic values are shaded					

Source: California Energy Commission, 2007.

The revised 2008 SMUD peak demand forecast, presented in Table 26, is also lower than both the draft 2008 forecast and the *CED 2006* forecast because of the revised population forecast.

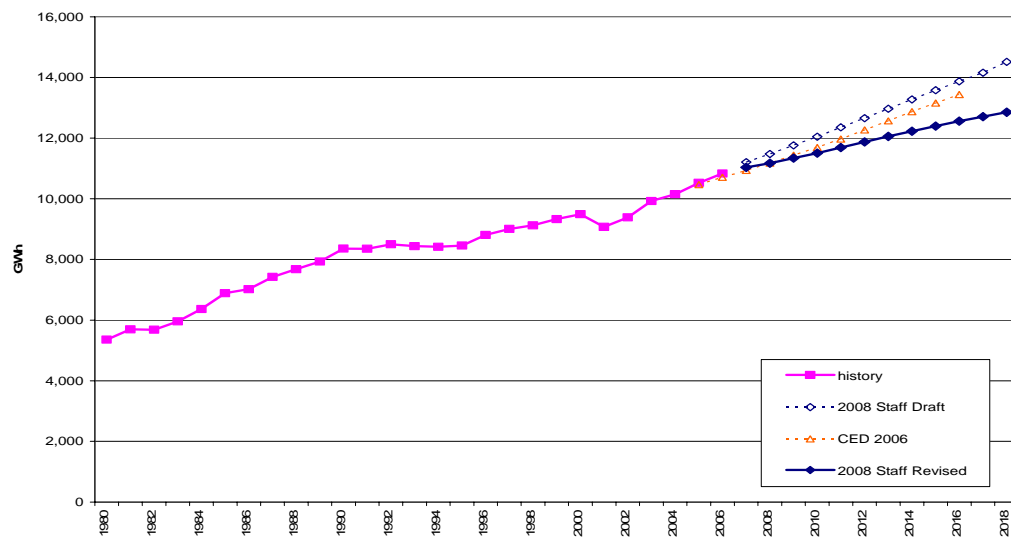
Table 26: SMUD Planning Area Electricity Consumption Forecast Comparison

Peak (MW)					
	CED 2006	Staff Draft	Staff Revised	Percent Difference Staff Revised/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	2,198	2,198	2,198	0.00%	0.00%
2000	2,693	2,693	2,693	0.00%	0.00%
2005	2,923	2,964	2,964	1.39%	0.00%
2008	3,136	3,207	3,174	1.20%	-1.03%
2013	3,567	3,645	3,415	-4.29%	-6.31%
2016	3,844	3,913	3,559	-7.40%	-9.03%
Average Annual Growth Rates					
1990-2000	2.05%	2.05%	2.05%		
2000-2005	1.66%	1.94%	1.94%		
2005-2008	2.37%	2.66%	2.30%		
2008-2016	2.58%	2.52%	1.44%		
Historic values are shaded					

Source: California Energy Commission, 2007.

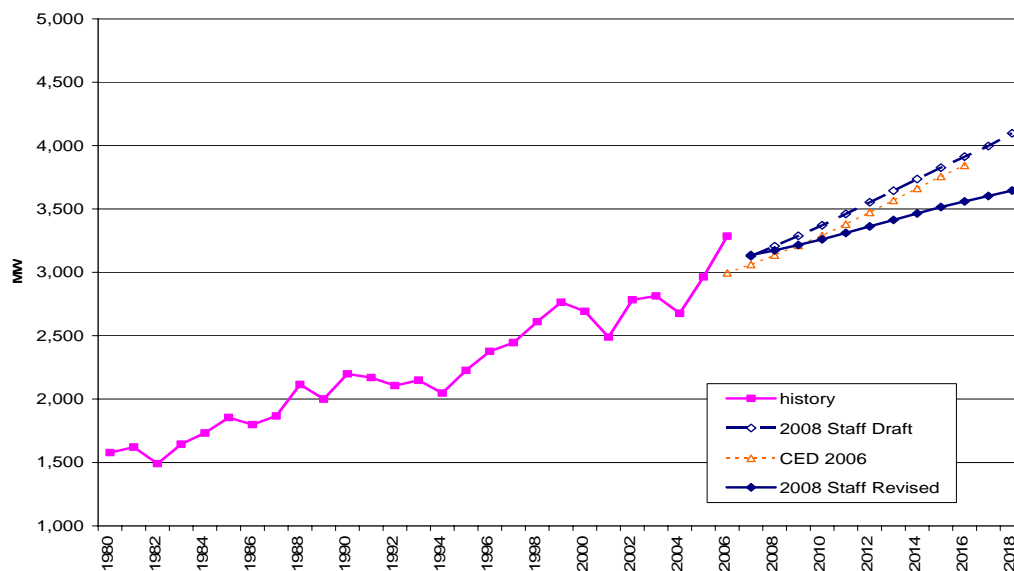
Figure 98 presents a graphical comparison of the revised 2008 electricity consumption forecast with the previous forecasts. Incorporation of the new DOF population forecast for the SMUD planning area causes the revised 2008 forecast to be lower over the entire forecast period than both of the previous forecasts. **Figure 99** presents a similar comparison of the respective peak forecasts. The differences in peak forecasts are caused by differences in the underlying electricity consumption forecasts.

Figure 98: SMUD Planning Area Electricity Forecast



Source: California Energy Commission, 2007.

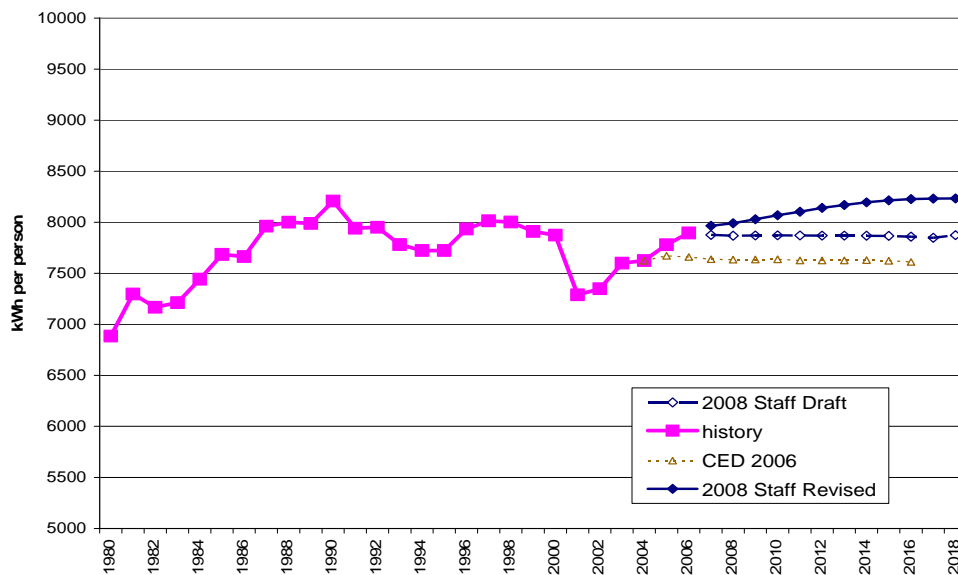
Figure 99: SMUD Planning Area Peak



Source: California Energy Commission, 2007.

Figure 100 compares the old and new per capita electricity consumption forecasts for the SMUD planning area. Projected per capita consumption in the revised 2008 forecast is higher than in the draft 2008 forecast. Part of the difference is caused by incorporating 2006 consumption data into the historic period. Industrial sector electricity consumption increased in 2006 over recent historic values. This had the effect of raising the starting level of per capita consumption slightly. Per capita consumption is projected to increase slightly in the SMUD planning area due to projected increases in use per household and higher projections of industrial consumption than were in the draft 2008 forecast.

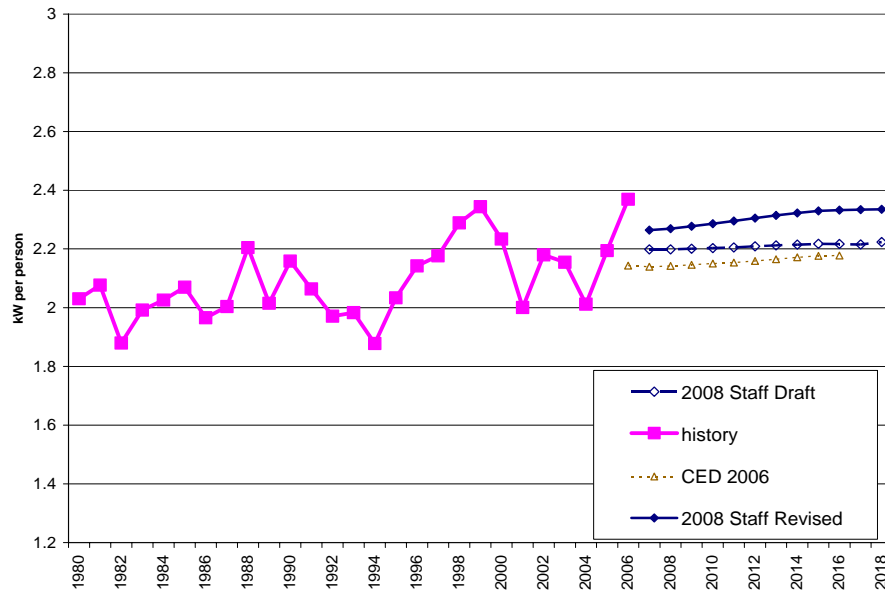
Figure 100: SMUD Planning Area per Capita Electricity Consumption



Source: California Energy Commission, 2007.

Revised 2008 per capita peak demand, shown in **Figure 101**, increases over the forecast period at a slightly higher level than the draft 2008 forecast. The projections are higher than the draft 2008 forecast because of increases in the assumed starting 2007 weather normalized starting point. The level is slightly higher than the draft 2008 forecast, but does not exceed levels seen in the mid- to late-1990s.

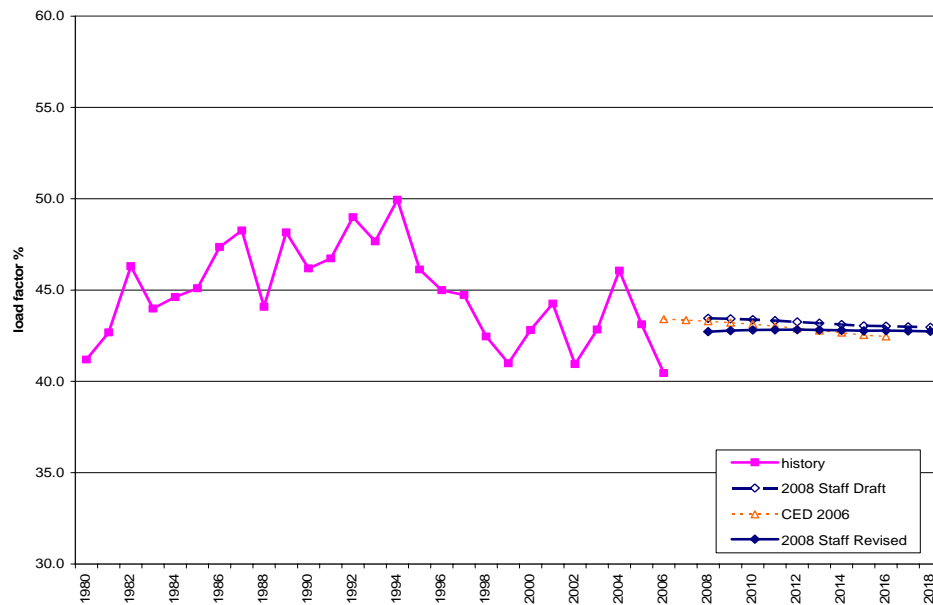
Figure 101: SMUD Planning Area per Capita Peak Demand



Source: California Energy Commission, 2007.

Figure 102 compares the load factors of the forecasts. The load factor is a measure of the relative increase in peak demand with respect to annual electricity consumption. Lower load factors indicate a large difference between peak and average demand, while higher load factors indicate a more uniform load. Variation in historic load factors is caused in part by annual weather patterns. The SMUD load factor has been declining since the mid-1990s, as the residential sector—with a continually increasing use of air conditioning—grew faster than other sectors. The forecasted load factor is projected to remain relatively constant over the forecast period as central air conditioning in the SMUD planning area reaches full saturation.

Figure 102: SMUD Planning Area Load Factor



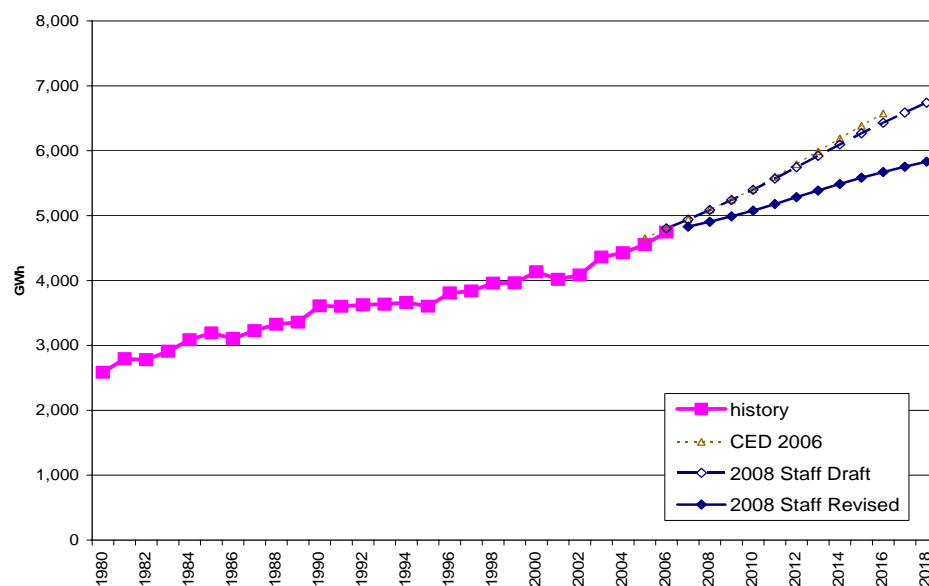
Source: California Energy Commission, 2007.

Sector Level Results and Input Assumptions

Residential

Figure 103 compares the revised 2008 with previous SMUD planning area residential forecasts. The revised 2008 forecast is substantially lower than both previous forecasts. This difference can be attributed to use of a new, lower long-term population forecast. The recent DOF long-term population forecast contained a reduction in SMUD planning area population of about 15 percent by the end of the forecast period.

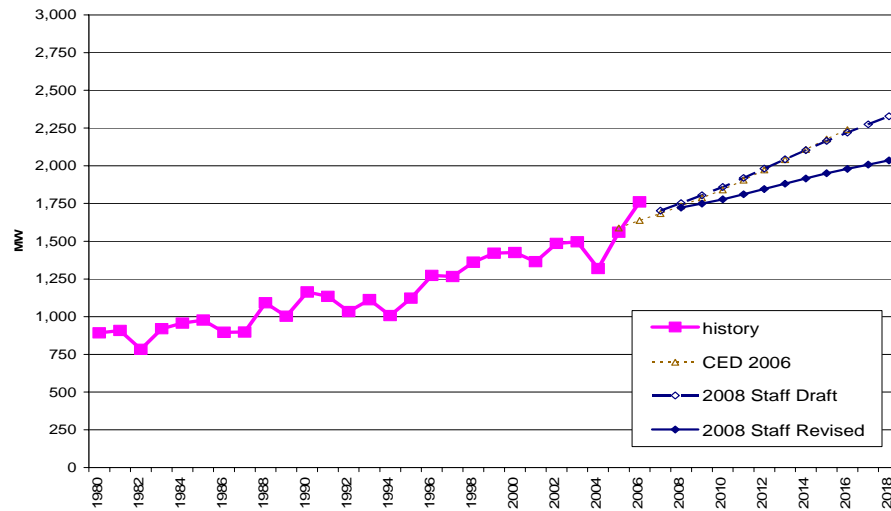
Figure 103: SMUD Planning Area Residential Consumption



Source: California Energy Commission, 2007.

Figure 104 provides a comparison of the revised 2008 with the previous forecasts. The revised 2008 differences follow the same pattern as differences in the electricity forecast and are also caused by decreased in the demographic forecast for the SMUD planning area.

Figure 104: SMUD Planning Area Residential Peak

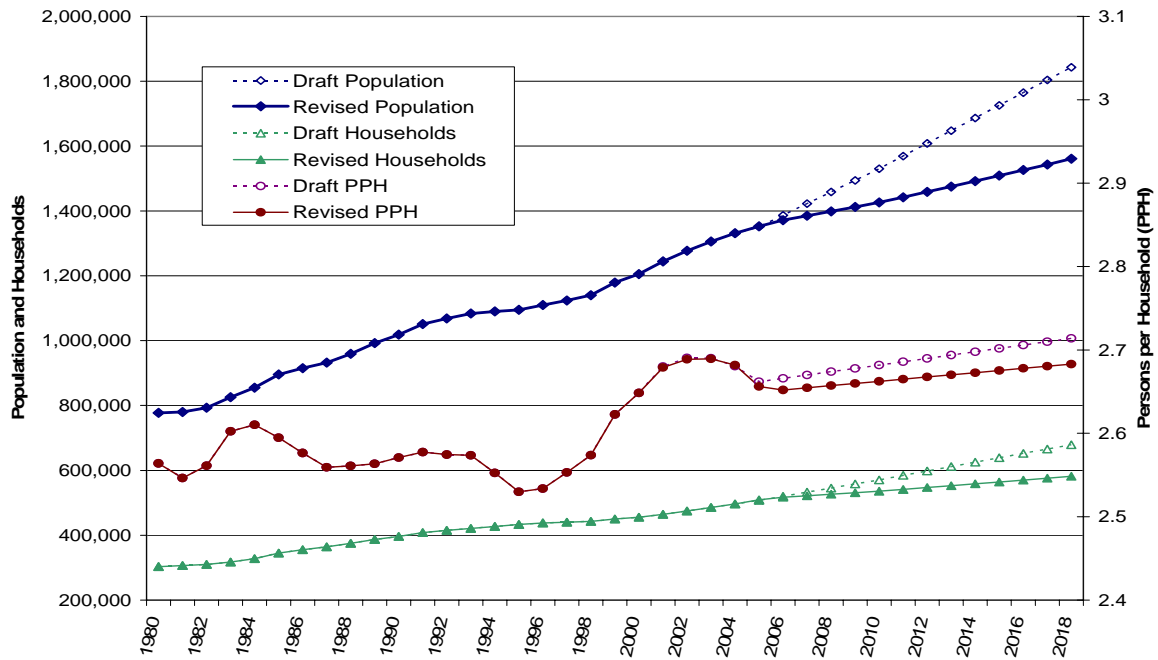


Source: California Energy Commission, 2007.

Figures 105 and 106 compare the residential drivers used in the revised 2008 forecast with drivers used in the draft 2008 forecast. Figure 105 compares total population, total households, and persons per household projections. The revised 2008 forecast has both lower population and persons per household projections. The reduction in persons per household projections dampens the effect of lower population so that the decrease in households is a smaller reduction than the decrease in population.

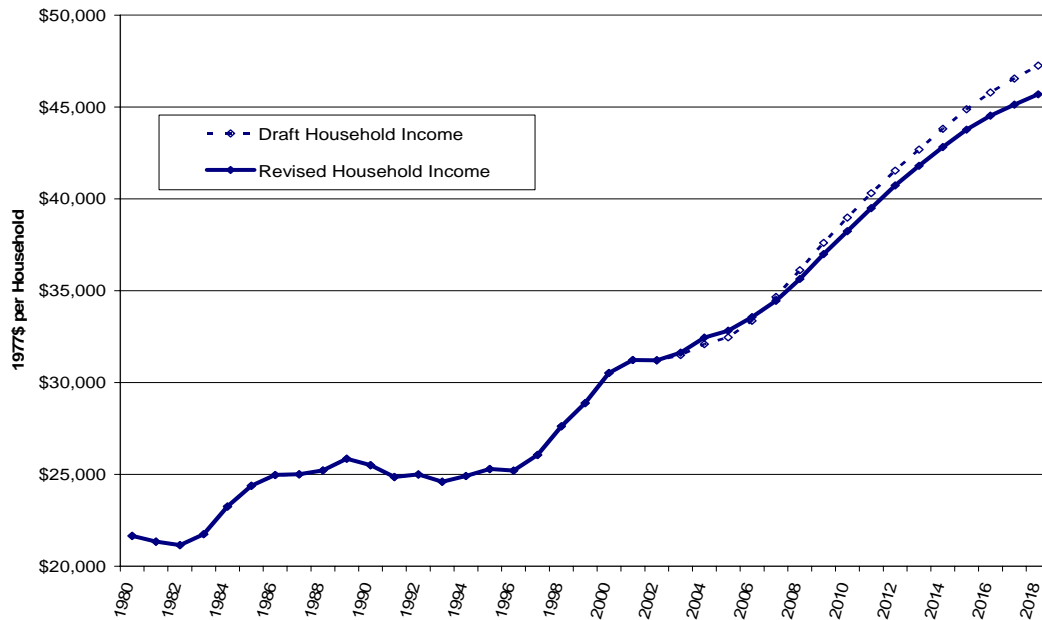
Figure 106 compares income per household between the two forecasts. Household income is derived as the product of per capita income and persons per household. The revised 2008 projection is lower than the draft 2008 projection and grows at a slightly lower rate than the draft 2008 forecast.

**Figure 105: SMUD Planning Area
Residential Demographic Projections**



Source: California Energy Commission, 2007.

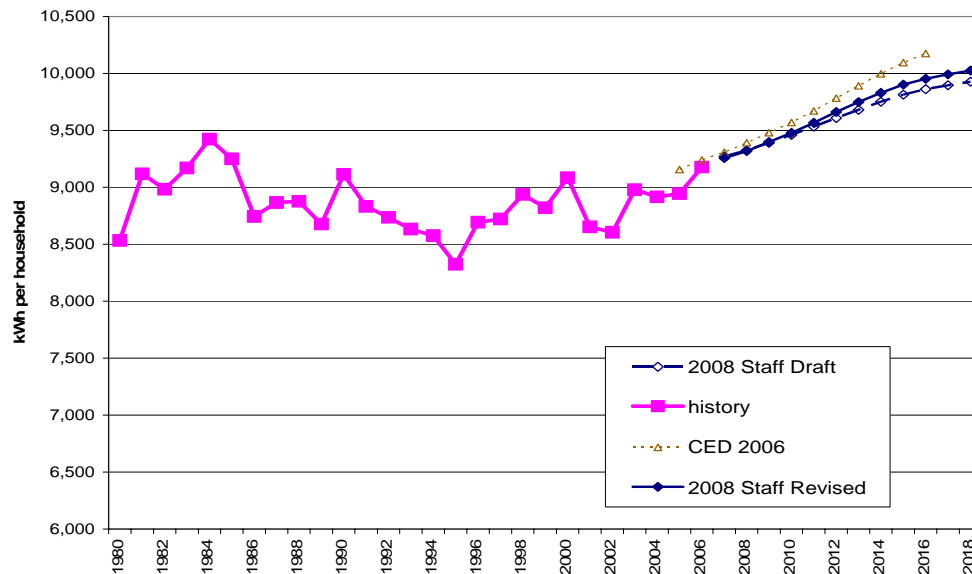
Figure 106: SMUD Planning Area Household Income Projections



Source: California Energy Commission, 2007.

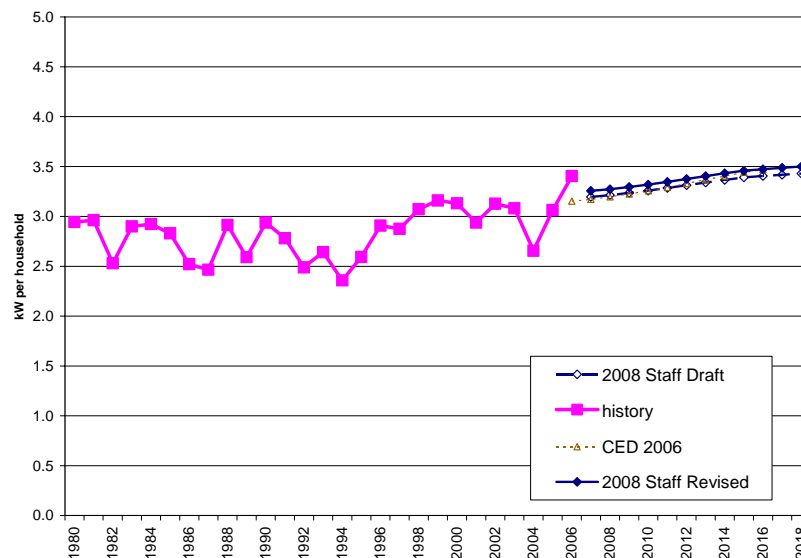
Figure 107 compares electricity use per household between the forecasts as well as with the 1980–2005 historic series. The revised 2008 use per household forecast is similar to the draft 2008 forecast. The increase in revised 2008 peak use per household, as seen in **Figure 108**, is caused by adjustments made to the weather normalized starting point.

Figure 107: SMUD Planning Area Electricity Use per Household



Source: California Energy Commission, 2007.

Figure 108: SMUD Planning Area Peak Use per Household



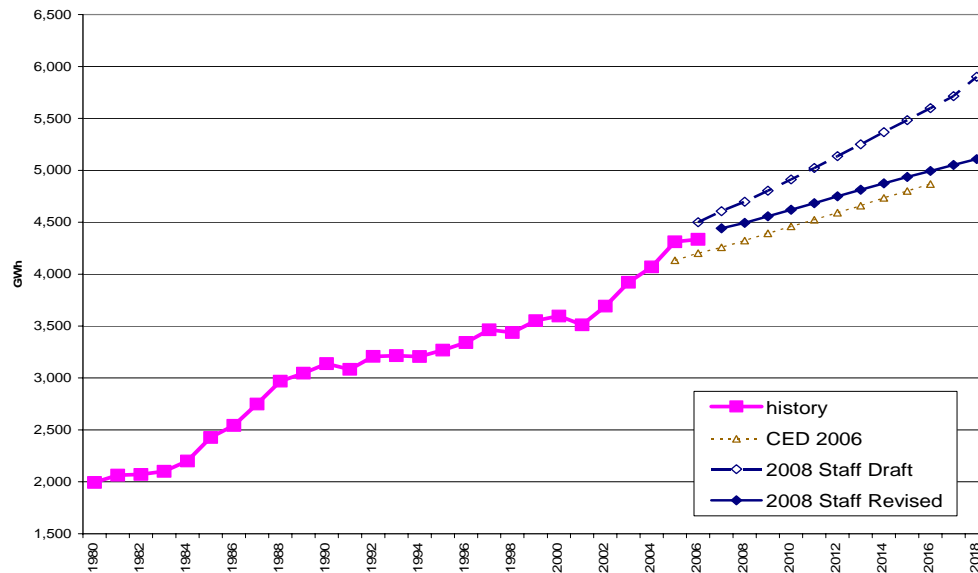
Source: California Energy Commission, 2007.

Commercial Building Sector

Figure 109 compares the commercial building sector forecasts. The revised 2008 forecast starts at a lower value because of inclusion of 2006 historic consumption data. The revised 2008 forecast also grows at a lower rate than the draft 2008 forecast due to the revised commercial floor space projections based on the aforementioned lower demographic projections. The building types for which projected floor decreased the most are large offices, warehouses, and hotels.

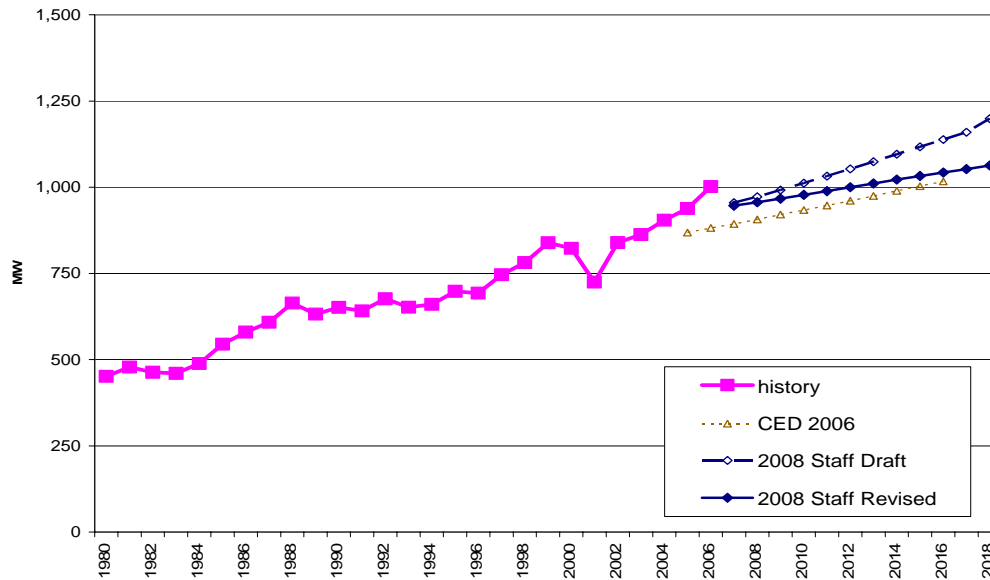
Figure 110 compares the commercial peak demand forecasts. The revised 2008 commercial peak forecast is lower throughout the forecast period caused by a lower starting point and the difference in underlying electricity consumption forecasts.

**Figure 109: SMUD Planning Area
Commercial Building Consumption**



Source: California Energy Commission, 2007.

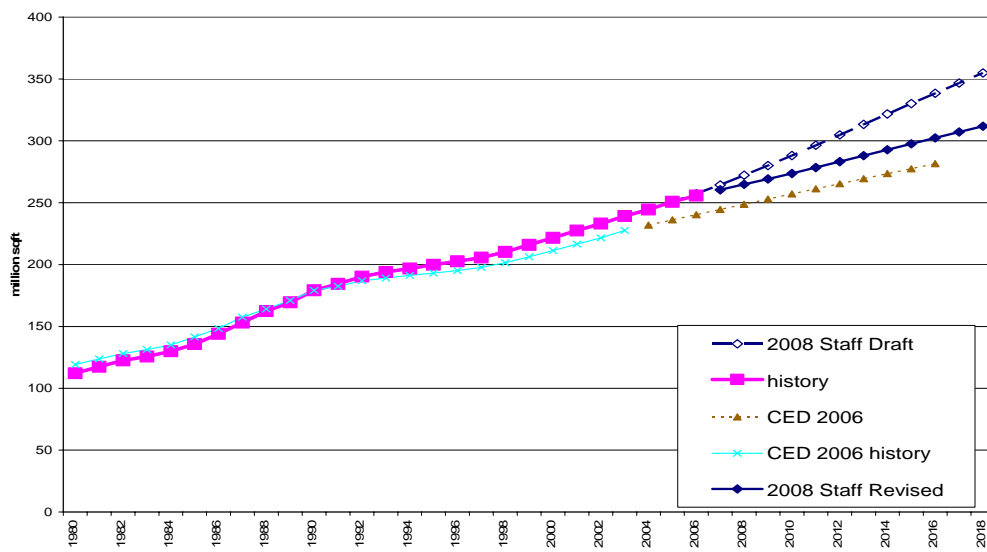
**Figure 110: SMUD Planning Area
Commercial Building Sector Peak**



Source: California Energy Commission, 2007.

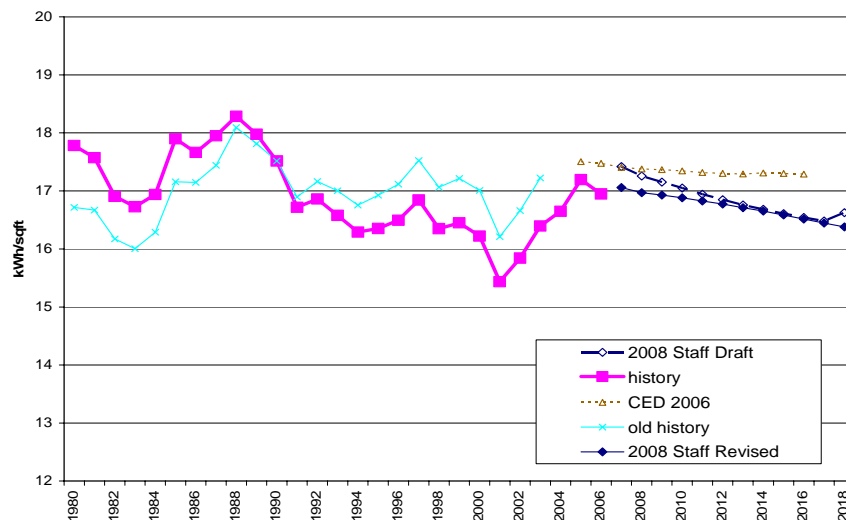
In staff's commercial building sector forecasting model, floor space by building type (for example, retail, offices, schools, and hospitals) is the key driver of electricity growth. **Figure 111** provides a comparison of total commercial floor space projections. The revised 2008 floor space projections are now lower over the forecast period than those used in the draft 2008 forecast.

Figure 111: SMUD Planning Area Commercial Floor Space



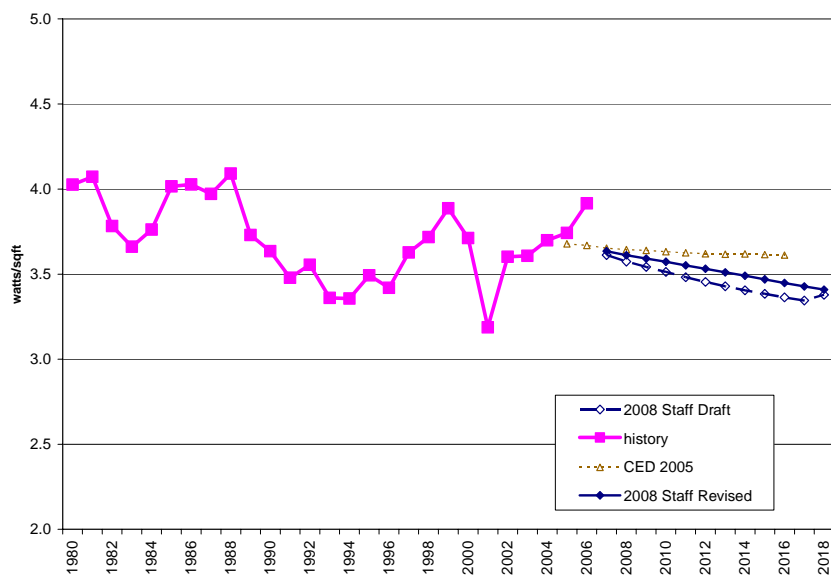
Figures 112 and 113 present the use per square foot comparisons for both electricity consumption and peak, respectively. In both cases the revised 2008 values decline at a lower rate than in the draft 2008 forecast. Electricity use per square foot is lower in the short term because of inclusion of 2006 consumption data. Electricity consumption per square foot declines a lower rate because of the reattribution of lighting savings to earlier years as described in Chapter 1. This has a similar result on peak use per square foot.

**Figure 112: SMUD Planning Area
Commercial kWh per Square Foot**



Source: California Energy Commission, 2007.

Figure 113: SMUD Planning Area Peak per Square Foot

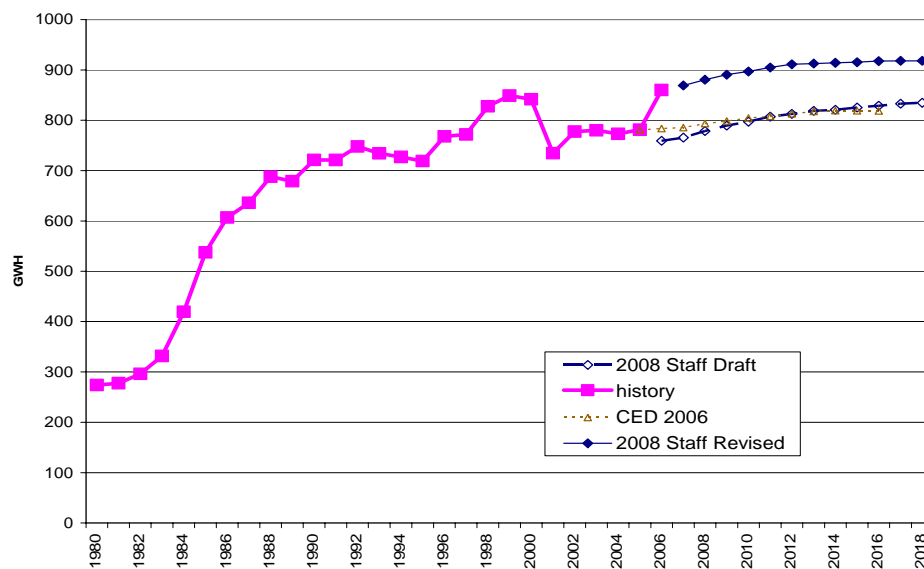


Source: California Energy Commission, 2007.

Industrial Sector

Figure 114 compares the SMUD planning area industrial sector electricity consumption forecasts. The revised 2008 industrial electricity consumption forecast is higher than both of the previous forecasts due to revisions in the historic consumption data. Inclusion of 2006 historic consumption increased the starting point of the revised 2008 forecast. It appears that this increased consumption is because of under-reporting in earlier years, not over-reporting for 2006; therefore, staff is treating this increase as a permanent effect. Staff will develop correct historical data sbefore the next forecast revision.

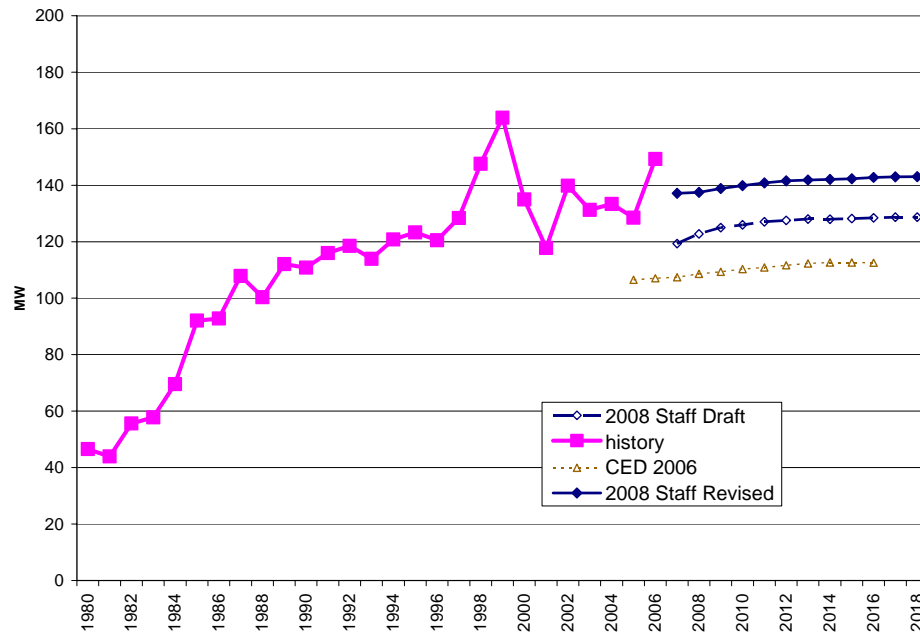
Figure 114: SMUD Planning Area Industrial Consumption



Source: California Energy Commission, 2007.

Figure 115 compares the industrial sector peak forecasts. The difference in the revised 2008 peak forecast is caused by the difference in the underlying electricity forecast.

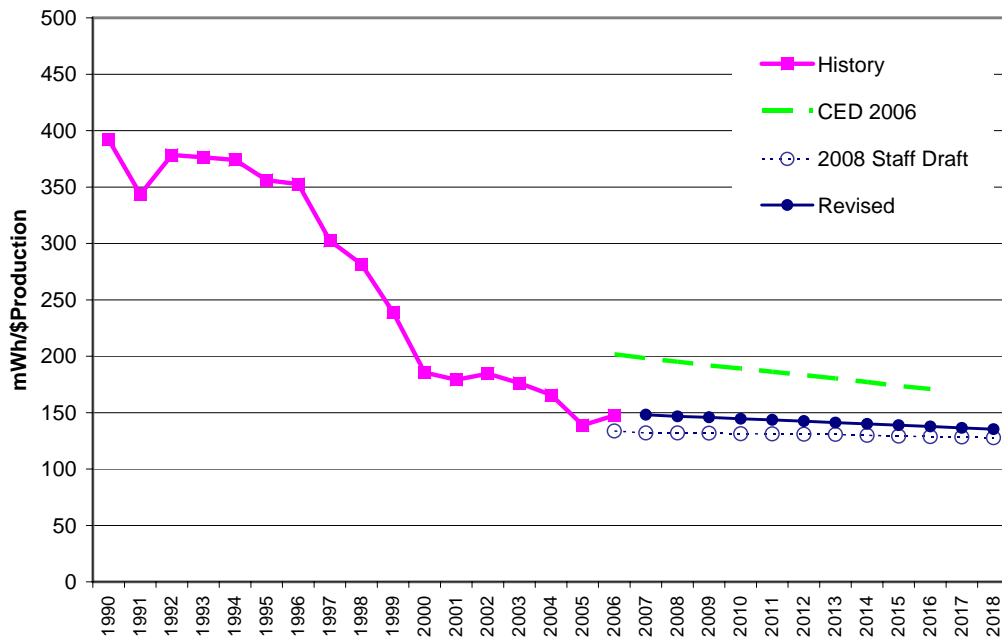
Figure 115: SMUD Planning Area Industrial Sector Peak



Source: California Energy Commission, 2007.

Figure 116 compares use-per-dollar value of production among the revised and draft 2008 forecasts and *CED 2006* forecast. The revised 2008 forecast is slightly higher than the draft 2008 forecast. The difference in kWh per dollar of industrial value added is caused by the increase in consumption in the last historic year. The similar decline witnessed in both the revised and draft 2008 projections is less than was projected in the *CED 2006* forecast.

**Figure 116: SMUD Planning Area
Industrial Use per Production Unit**



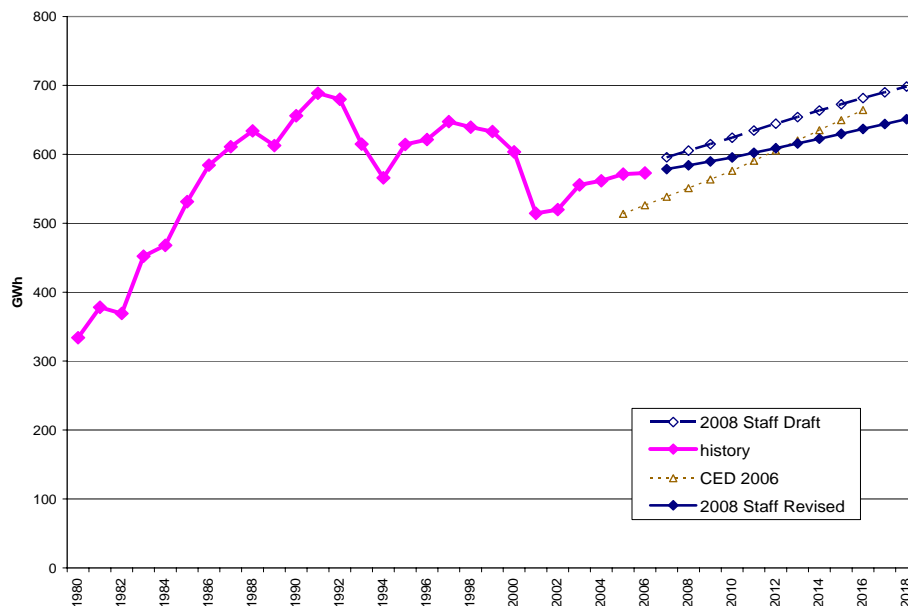
Source: California Energy Commission, 2007.

Other Sectors

Figures 117 and 118 provide comparisons of the remaining sector electricity consumption forecasts. Figure 117 compares the transportation, communication, and utilities sector forecasts. The revised 2008 forecast is lower than the draft 2008 forecast because of lower economic and demographic drivers.

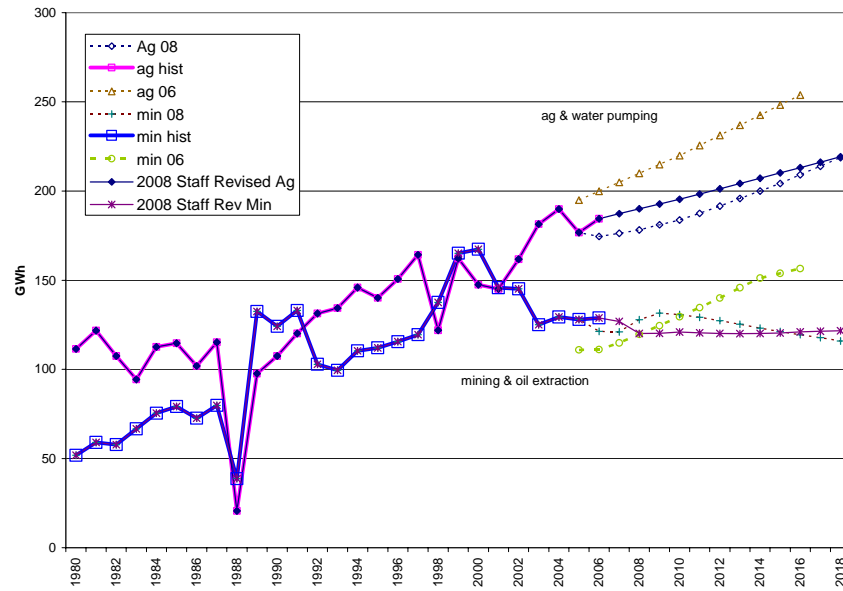
Figure 118 compares forecasts for the agriculture and water pumping and mining and oil extraction sectors. The revised 2008 agriculture and water pumping forecast starts from a higher point due to inclusion of 2006 consumption data, but grows at a lower rate because of lower demographic projections. The net result is a forecast that is very similar at the end of the forecast period. After a decline in the first two years of the forecast, the revised 2008 mining and oil extraction forecast remains relatively constant over the forecast period. This results in a forecast that is similar to the draft 2008 forecast by the end of the forecast period.

**Figure 117: SMUD Planning Area
Transportation, Communication, and Utilities Sector
Electricity Consumption**



Source: California Energy Commission, 2007.

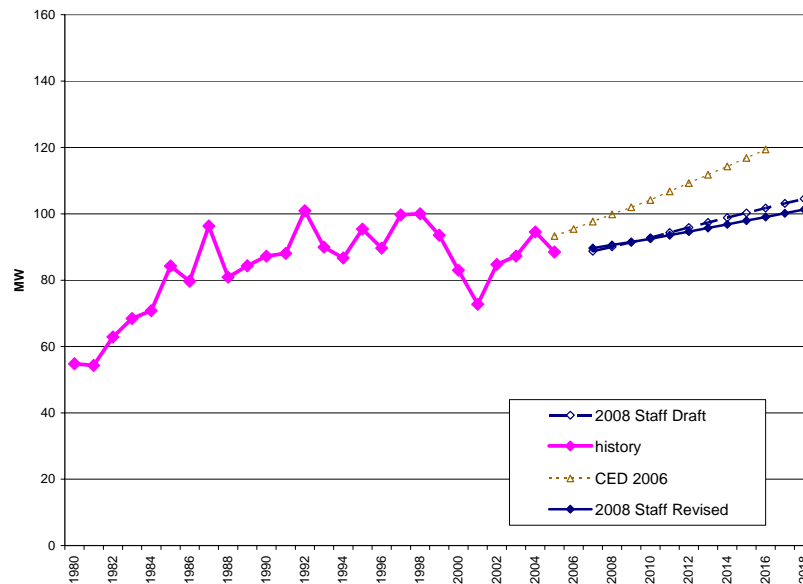
**Figure 118: SMUD Planning Area
Agriculture and Water Pumping and Mining and Oil Extraction
Electricity Consumption Forecasts**



Source: California Energy Commission, 2007.

Figure 119 compares the combined other sector peaks for the revised 2008 forecast with previous forecasts. The revised 2008 forecast is lower toward the end of the forecast period as a result of the lower growth in the corresponding electricity forecasts.

Figure 119: SMUD Planning Area Other Sector Peak



Source: California Energy Commission, 2007.

Electricity Prices

As in the draft forecast, the revised 2008 forecast used prices which are held constant (in real terms) at the 2005 level for all sectors. This is in contrast to the declining price forecast which was used in the *CED 2006* price forecast. This change results in slightly lower demand in most customer sectors.

Self Generation

As discussed in Chapter 1, the peak demand forecast is reduced by staff's current estimates of the effects of the Self-Generation Incentive Program, the California Solar Initiative, and similar programs. These programs are forecast based on the recent trend of installations. SMUD has had an aggressive solar program for many years, but the historic impacts have not been accounted for in staff's previous forecast or historic data. The forecast of peak impacts for the SMUD area represent incremental installations from 2007 forward. The forecast assumes about 800 kW of new installed capacity per year, for a coincident peak reduction of about 500 kW per year. The cumulative forecast is shown in Forms 1.2 and 1.4 following this chapter.

Conservation Savings Embedded in the Forecast

As discussed in Chapter 1, savings from building and appliance standards through 2005 are modeled in the staff residential and commercial demand forecast models. Savings from historic public agency and utility programs funded through 2008 are also included. To estimate the magnitude of these savings, the models are run without these programs—in effect, in the chronological order of the programs' occurrence. The savings are then calculated by subtracting the results of the run with the program in effect from the results without the program in effect. A condensed version of the results of this analysis is presented here as a partial estimate of savings, which are embedded in the forecast. **Table 27** presents electricity consumption savings, by broad program category, for selected years. **Table 28** presents similar estimates of peak savings. These tables do not quantify the effects of decreasing energy intensity (whether market- or program-driven) in other sectors.

Table 27: SMUD Planning Area Electricity Conservation Savings Estimates (GWH)

	1990	2000	2005	2008	2013	2018
Residential Energy Savings (GWH)						
Building Standards	462	651	760	803	868	944
Appliance Standards	172	438	599	661	747	822
Programs	208	259	261	252	178	119
Market and Price Effects	29	38	44	45	47	49
Total Residential Savings	870	1386	1663	1761	1839	1934
Commercial Energy Savings (GWH)						
Building Standards	76	207	316	385	505	636
Appliance Standards	42	115	163	194	244	296
Programs	6	56	56	56	56	54
Market and Price Effects	662	637	869	931	1043	1144
Total Commercial Savings	785	1014	1404	1565	1847	2130
Total Energy Savings	1655	2400	3067	3326	3686	4064

Table 28: SMUD Planning Area Peak Conservation Savings Estimates (MW)

	1990	2000	2005	2008	2013	2018
Residential Energy Savings (MW)						
Building Standards	289	409	479	496	518	549
Appliance Standards	22	57	78	86	97	107
Utility and Public Agency Programs	78	98	98	94	64	41
Market and Price Effects	7	9	10	10	11	11
Total Residential Savings	396	573	665	686	691	708
Commercial Energy Savings (MW)						
Building Standards	17	48	73	88	116	146
Appliance Standards	10	26	38	45	56	68
Utility and Public Agency Programs	1	11	11	11	11	10
Market and Price Effects	152	146	200	214	240	263
Total Commercial Savings	180	231	321	358	423	488
Total Energy Savings	576	804	986	1044	1113	1196

Form 1.1 - SMUD Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Electricity Consumption by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1980	2,587	1,994	274	52	111	278	56	5,352
1981	2,794	2,064	278	59	122	322	56	5,695
1982	2,781	2,071	297	58	107	311	58	5,683
1983	2,910	2,102	332	67	94	396	56	5,956
1984	3,086	2,200	420	75	113	415	53	6,362
1985	3,193	2,428	538	79	115	476	56	6,884
1986	3,107	2,543	607	73	102	528	57	7,016
1987	3,229	2,749	636	80	115	552	59	7,419
1988	3,326	2,969	688	39	21	574	60	7,677
1989	3,359	3,046	679	133	98	550	62	7,927
1990	3,611	3,138	721	124	107	589	67	8,358
1991	3,603	3,083	721	133	120	620	68	8,349
1992	3,626	3,208	748	103	131	611	68	8,496
1993	3,636	3,216	734	100	134	547	68	8,435
1994	3,662	3,207	727	110	146	495	71	8,418
1995	3,604	3,268	719	112	140	542	72	8,458
1996	3,808	3,342	768	116	151	547	75	8,805
1997	3,839	3,464	772	119	164	572	75	9,006
1998	3,959	3,437	828	138	122	564	75	9,123
1999	3,966	3,551	849	165	162	553	80	9,326
2000	4,135	3,596	842	167	147	523	81	9,491
2001	4,019	3,511	735	146	145	436	79	9,070
2002	4,087	3,692	778	145	162	441	79	9,383
2003	4,361	3,921	780	125	181	476	80	9,924
2004	4,426	4,070	773	129	190	482	80	10,150
2005	4,554	4,311	781	128	177	490	81	10,523
2006	4,747	4,336	860	129	184	493	80	10,829
2007	4,830	4,442	869	127	187	498	81	11,034
2008	4,905	4,495	880	120	190	503	82	11,174
2009	4,990	4,557	891	120	193	508	82	11,341
2010	5,077	4,620	897	121	195	513	83	11,506
2011	5,178	4,684	905	120	198	518	84	11,689
2012	5,284	4,750	911	120	201	524	85	11,875
2013	5,387	4,813	913	120	204	530	86	12,053
2014	5,488	4,876	914	120	207	536	86	12,228
2015	5,585	4,936	915	120	210	542	87	12,397
2016	5,672	4,994	918	121	213	548	88	12,555
2017	5,753	5,051	918	121	216	555	89	12,704
2018	5,832	5,108	918	122	219	561	90	12,851

Annual Growth Rates (%)

1980-1990	3.4	4.6	10.2	9.1	-0.4	7.8	1.8	4.6
1990-2000	1.4	1.4	1.6	3.0	3.2	-1.2	1.9	1.3
2000-2006	2.3	3.2	0.4	-4.3	3.8	-1.0	-0.2	2.2
2006-2011	1.8	1.6	1.0	-1.3	1.5	1.0	0.9	1.5
2011-2018	1.7	1.2	0.2	0.1	1.4	1.1	1.0	1.4
2006-2018	1.7	1.4	0.5	-0.5	1.4	1.1	1.0	1.4

Form 1.1b - SMUD Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Electricity Sales by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1990	3,611	3,138	721	124	107	589	67	8,358
1991	3,603	3,083	721	133	120	620	68	8,349
1992	3,626	3,208	748	103	131	611	68	8,496
1993	3,636	3,216	734	100	134	547	68	8,435
1994	3,662	3,207	727	110	146	495	71	8,418
1995	3,604	3,268	719	112	140	542	72	8,458
1996	3,808	3,342	768	116	151	547	75	8,805
1997	3,839	3,464	772	119	164	572	75	9,006
1998	3,959	3,437	828	138	122	564	75	9,123
1999	3,966	3,551	849	165	162	553	80	9,326
2000	4,135	3,596	842	167	147	523	81	9,491
2001	4,019	3,511	735	146	145	436	79	9,070
2002	4,087	3,692	778	145	162	441	79	9,383
2003	4,361	3,921	780	125	181	476	80	9,924
2004	4,426	4,070	773	129	190	482	80	10,150
2005	4,554	4,311	781	128	177	490	81	10,523
2006	4,747	4,336	860	129	184	493	80	10,829
2007	4,830	4,441	869	127	187	498	81	11,033
2008	4,905	4,493	880	120	190	503	82	11,172
2009	4,990	4,555	891	120	193	508	82	11,338
2010	5,077	4,617	897	121	195	513	83	11,502
2011	5,177	4,680	905	120	198	518	84	11,683
2012	5,283	4,744	911	120	201	524	85	11,869
2013	5,386	4,807	913	120	204	530	86	12,045
2014	5,486	4,868	914	120	207	536	86	12,219
2015	5,584	4,928	915	120	210	542	87	12,387
2016	5,671	4,985	918	121	213	548	88	12,544
2017	5,752	5,041	918	121	216	555	89	12,692
2018	5,830	5,098	918	122	219	561	90	12,838

Annual Growth Rates (%)

1980-1990	3.4	4.6	10.2	9.1	-0.4	7.8	1.8	4.6
1990-2000	1.4	1.4	1.6	3.0	3.2	-1.2	1.9	1.3
2000-2006	2.3	3.2	0.4	-4.3	3.8	-1.0	-0.2	2.2
2006-2011	1.8	1.5	1.0	-1.3	1.5	1.0	0.9	1.5
2011-2018	1.7	1.2	0.2	0.1	1.4	1.1	1.0	1.4
2006-2018	1.7	1.4	0.5	-0.5	1.4	1.1	1.0	1.4

Form 1.2 - SMUD
California Energy Demand 2008-2018 Staff Revised Forecast
Net Energy for Load (GWh)

Year	Total Consumption	Net Losses	Gross Generation	Non-PV Self Generation	Incremental PV	Total Private Supply	Net Energy for Load
1980	5,352	343	5,695	0	0	0	5,695
1981	5,695	364	6,059	0	0	0	6,059
1982	5,683	364	6,047	0	0	0	6,047
1983	5,956	381	6,337	0	0	0	6,337
1984	6,362	407	6,769	0	0	0	6,769
1985	6,884	441	7,325	0	0	0	7,325
1986	7,016	449	7,465	0	0	0	7,465
1987	7,419	475	7,894	0	0	0	7,894
1988	7,677	491	8,168	0	0	0	8,168
1989	7,927	507	8,434	0	0	0	8,434
1990	8,358	535	8,893	0	0	0	8,893
1991	8,349	534	8,884	0	0	0	8,884
1992	8,496	544	9,040	0	0	0	9,040
1993	8,435	540	8,974	0	0	0	8,974
1994	8,418	539	8,957	0	0	0	8,957
1995	8,458	541	8,999	0	0	0	8,999
1996	8,805	564	9,369	0	0	0	9,369
1997	9,006	576	9,583	0	0	0	9,583
1998	9,123	584	9,707	0	0	0	9,707
1999	9,326	597	9,923	0	0	0	9,923
2000	9,491	607	10,098	0	0	0	10,098
2001	9,070	580	9,650	0	0	0	9,650
2002	9,383	601	9,983	0	0	0	9,983
2003	9,924	635	10,559	0	0	0	10,559
2004	10,150	650	10,800	0	0	0	10,800
2005	10,523	673	11,196	0	0	0	11,196
2006	10,829	693	11,522	0	0	0	11,522
2007	11,034	706	11,741	0	1	1	11,740
2008	11,174	715	11,890	0	2	2	11,887
2009	11,341	726	12,067	0	3	3	12,063
2010	11,506	736	12,243	0	4	4	12,239
2011	11,689	748	12,437	0	5	5	12,431
2012	11,875	760	12,635	0	6	6	12,629
2013	12,053	771	12,824	0	7	7	12,817
2014	12,228	783	13,010	0	9	9	13,002
2015	12,397	793	13,190	0	10	10	13,180
2016	12,555	804	13,358	0	11	11	13,348
2017	12,704	813	13,517	0	12	12	13,505
2018	12,851	822	13,673	0	13	13	13,661

Annual Growth Rates (%)

1980-1990	4.6	4.6	4.6			4.6
1990-2000	1.3	1.3	1.3			1.3
2000-2006	2.2	2.2	2.2			2.2
2006-2011	1.5	1.5	1.5			1.5
2011-2018	1.4	1.4	1.4	13.3	13.3	1.4
2006-2018	1.4	1.4	1.4			1.4

Form 1.3 - SMUD Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Coincident Peak Demand by Sector (MW)

Year	Residential	Commercial	Industrial	Agricultural	Other	Total Demand
1980	892	451	47	14	41	1,445
1981	908	478	44	12	42	1,484
1982	783	463	56	14	49	1,365
1983	920	460	58	11	57	1,506
1984	957	489	70	13	58	1,586
1985	977	545	92	14	70	1,698
1986	896	580	93	10	70	1,648
1987	898	608	108	14	82	1,710
1988	1,092	664	100	2	79	1,937
1989	1,003	632	112	10	74	1,831
1990	1,164	651	111	11	76	2,013
1991	1,134	641	116	12	83	1,987
1992	1,033	676	119	14	87	1,929
1993	1,112	652	114	14	76	1,968
1994	1,007	661	121	16	71	1,875
1995	1,122	698	123	15	80	2,039
1996	1,274	693	121	15	75	2,177
1997	1,266	746	128	18	82	2,240
1998	1,361	781	148	14	87	2,390
1999	1,420	839	164	19	89	2,531
2000	1,425	823	135	13	70	2,466
2001	1,364	725	118	14	59	2,279
2002	1,485	840	140	17	68	2,549
2003	1,496	863	131	18	69	2,577
2004	1,319	904	133	20	75	2,451
2005	1,559	938	128	17	71	2,714
2006	1,761	1,002	149	20	77	3,009
2007	1,699	947	137	18	71	2,873
2008	1,723	956	137	19	72	2,907
2009	1,749	967	139	19	73	2,947
2010	1,778	978	140	19	73	2,988
2011	1,811	989	141	19	74	3,034
2012	1,846	1,000	142	20	75	3,082
2013	1,881	1,011	142	20	76	3,130
2014	1,916	1,022	142	20	77	3,177
2015	1,950	1,033	142	20	78	3,223
2016	1,979	1,043	143	21	78	3,263
2017	2,008	1,053	143	21	79	3,304
2018	2,036	1,063	143	21	80	3,343

Annual Growth Rates (%)

1980-1990	2.7	3.7	9.1	-2.6	6.5	3.4
1990-2000	2.0	2.4	2.0	1.8	-0.8	2.0
2000-2006	3.6	3.3	1.7	7.6	1.5	3.4
2006-2011	0.6	-0.3	-1.2	-0.5	-0.8	0.2
2011-2018	1.7	1.0	0.2	1.2	1.1	1.4
2006-2018	1.2	0.5	-0.4	0.5	0.3	0.9

Form 1.4 - SMUD Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Peak Demand (MW)

Year	Total End Use Load	Net Losses	Gross Generation	Non-PV Self Generation	Incremental PV	Total Private Supply	Net Peak Demand	Load Factor (%)
1980	1,445	133	1,578	0	0	0	1,578	41
1981	1,484	137	1,621	0	0	0	1,621	43
1982	1,365	126	1,491	0	0	0	1,491	46
1983	1,506	139	1,645	0	0	0	1,645	44
1984	1,586	146	1,732	0	0	0	1,732	45
1985	1,698	156	1,854	0	0	0	1,854	45
1986	1,648	152	1,800	0	0	0	1,800	47
1987	1,710	157	1,867	0	0	0	1,867	48
1988	1,937	178	2,115	0	0	0	2,115	44
1989	1,831	168	1,999	0	0	0	1,999	48
1990	2,013	185	2,198	0	0	0	2,198	46
1991	1,987	183	2,170	0	0	0	2,170	47
1992	1,929	177	2,106	0	0	0	2,106	49
1993	1,968	181	2,149	0	0	0	2,149	48
1994	1,875	172	2,047	0	0	0	2,047	50
1995	2,039	188	2,227	0	0	0	2,227	46
1996	2,177	200	2,377	0	0	0	2,377	45
1997	2,240	206	2,446	0	0	0	2,446	45
1998	2,390	220	2,610	0	0	0	2,610	42
1999	2,531	233	2,764	0	0	0	2,764	41
2000	2,466	227	2,693	0	0	0	2,693	43
2001	2,279	210	2,489	0	0	0	2,489	44
2002	2,549	235	2,784	0	0	0	2,784	41
2003	2,577	237	2,814	0	0	0	2,814	43
2004	2,451	225	2,677	0	0	0	2,677	46
2005	2,714	250	2,964	0	0	0	2,964	43
2006	3,009	277	3,286	0	0	0	3,286	40
2007	2,873	264	3,137	0	0	0	3,136	43
2008	2,907	267	3,175	0	1	1	3,174	43
2009	2,947	271	3,218	0	1	1	3,216	43
2010	2,988	275	3,262	0	2	2	3,261	43
2011	3,034	279	3,313	0	2	2	3,311	43
2012	3,082	284	3,366	0	3	3	3,363	43
2013	3,130	288	3,418	0	3	3	3,415	43
2014	3,177	292	3,469	0	4	4	3,465	43
2015	3,223	297	3,519	0	4	4	3,515	43
2016	3,263	300	3,564	0	5	5	3,559	43
2017	3,304	304	3,608	0	5	5	3,603	43
2018	3,343	308	3,651	0	5	5	3,645	43

Annual Growth Rates (%)

1980-1990	3.4	3.4	3.4			3.4	1.1
1990-2000	2.0	2.0	2.0			2.0	-0.8
2000-2006	3.4	3.4	3.4			3.4	-1.1
2006-2011	0.2	0.2	0.2			0.2	1.4
2011-2018	1.4	1.4	1.4		13.3	13.3	0.0
2006-2018	0.9	0.9	0.9				0.6

Form 2.2 - SMUD Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Planning Area Economic and Demographic Assumptions

Year	Population	Households	Persons per Household	Real Personal Income (Millions 1977\$)	Industrial Value Added (Millions 2005\$)	Commercial Floorspace (MM Sqft.)
1980	777,293	303,167	2.56	303,167	12,902	112
1981	780,352	306,447	2.55	6,536	13,204	117
1982	792,948	309,611	2.56	6,547	12,795	122
1983	825,773	317,329	2.60	6,899	12,953	126
1984	854,930	327,533	2.61	7,613	13,620	130
1985	895,717	345,209	2.59	8,413	13,994	136
1986	915,570	355,372	2.58	8,869	14,184	144
1987	931,933	364,140	2.56	9,101	14,790	153
1988	959,537	374,667	2.56	9,445	15,557	162
1989	992,208	387,052	2.56	10,003	16,123	169
1990	1,018,433	396,134	2.57	10,100	16,469	179
1991	1,051,318	407,886	2.58	10,136	15,937	184
1992	1,068,645	415,085	2.57	10,373	15,878	190
1993	1,083,913	421,153	2.57	10,358	15,868	194
1994	1,090,144	427,082	2.55	10,637	15,791	197
1995	1,095,152	432,887	2.53	10,946	16,659	200
1996	1,109,749	438,011	2.53	11,038	16,411	203
1997	1,123,820	440,189	2.55	11,469	17,471	206
1998	1,140,219	443,015	2.57	12,232	17,603	210
1999	1,179,070	449,589	2.62	12,980	17,030	216
2000	1,205,262	455,082	2.65	13,886	17,401	222
2001	1,244,772	464,467	2.68	14,497	15,249	227
2002	1,277,694	474,891	2.69	14,815	14,711	233
2003	1,306,409	485,654	2.69	15,290	14,289	239
2004	1,330,737	496,451	2.68	15,925	15,022	244
2005	1,355,419	509,173	2.66	16,470	15,308	251
2006	1,378,920	517,232	2.67	17,350	15,553	256
2007	1,393,146	521,793	2.67	18,466	15,731	260
2008	1,407,512	526,391	2.67	19,700	16,000	265
2009	1,422,026	531,030	2.68	20,984	16,215	269
2010	1,436,680	535,707	2.68	22,242	16,364	274
2011	1,453,743	541,264	2.69	23,550	16,562	278
2012	1,471,001	546,877	2.69	24,840	16,660	283
2013	1,488,462	552,547	2.69	26,106	16,794	288
2014	1,506,125	558,275	2.70	27,391	16,837	293
2015	1,523,994	564,060	2.70	28,666	16,930	298
2016	1,542,075	569,904	2.71	29,868	16,996	302
2017	1,560,365	575,808	2.71	30,989	17,050	307
2018	1,578,874	581,773	2.71	32,088	17,056	312

Annual Growth Rates (%)

1980-1990	2.7	2.7	0.0	-28.8	2.5	4.8
1990-2000	1.7	1.4	0.3	3.2	0.6	2.2
2000-2006	2.3	2.2	0.1	3.8	-1.9	2.4
2006-2011	1.1	0.9	0.1	6.3	1.3	1.7
2011-2018	1.2	1.0	0.1	4.5	0.4	1.6
2006-2018	1.1	1.0	0.1	5.3	0.8	1.7

CHAPTER 6: LOS ANGELES DEPARTMENT OF WATER AND POWER PLANNING AREA

The Los Angeles Department of Water and Power (LADWP) planning area includes LADWP bundled retail customers and customers served by any energy service providers (ESPs) using the LADWP distribution system to deliver electricity to end users.

This chapter is organized similar to previous chapters. First, forecasted consumption and peak loads for the LADWP planning area are discussed; both total and per capita values are presented. The revised 2008 values are compared to the draft 2008 and *CED 2006* forecasts, and forecast differences are discussed.

The forecasted load factor, jointly determined by the annual energy consumption and peak load estimates, is also discussed. Second, sector consumption and peak load forecasts are presented. The residential, commercial, industrial, and “other” sector forecasts are compared to those in the previous forecasts. Third, the sector electricity prices used as inputs to the staff draft forecast are presented. Fourth, self generation included in the forecast is briefly discussed, and finally estimates of conservation savings embedded in revised forecast are presented and discussed.

Forecast Results

Table 29 compares electricity consumption of the revised 2008 forecast with both the draft 2008 forecast and the *CED 2006* forecast. The revised 2008 forecast is very similar to the draft 2008 forecast. Both the revised and draft 2008 forecasts are higher than the *CED 2006* forecast. A slight decrease in the residential sector because of lower population projections is offset by an increase in industrial consumption. The draft forecast used Economy.com projections of industrial production, which in the LADWP area declined by 1.4 percent annually. This very pessimistic outlook appeared inconsistent with relatively flat consumption in the LADWP industrial sector; therefore, staff revised the economic drivers to a more moderate decline of 0.9 percent.

Table 29: LADWP Planning Area Electricity Forecast Comparison

Consumption (GWH)					
	CED 2006	Staff Draft	Staff Revised	Percent Difference Staff Revised/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	23,263	23,263	23,263	0.00%	0.00%
2000	23,296	23,437	23,437	0.60%	0.00%
2005	25,428	24,639	24,638	-3.11%	0.00%
2008	25,778	25,989	25,921	0.55%	-0.26%
2013	26,178	26,683	26,670	1.88%	-0.05%
2016	26,289	26,968	26,977	2.62%	0.04%
Average Annual Growth Rates					
1990-2000	0.01%	0.07%	0.07%		
2000-2005	1.77%	1.00%	1.00%		
2005-2008	0.46%	1.79%	1.71%		
2008-2016	0.25%	0.46%	0.50%		
Historic values are shaded					

Source: California Energy Commission, 2007.

Table 30 compares the revised 2008 peak forecast with the previous forecasts. The revised 2008 forecast is about 100 MW (2 to 2.5 percent) lower than the draft 2008 forecast. The revised 2008 peak forecast is also lower than the *CED 2006* in the beginning of the forecast period, but by the end of the forecast period the two forecasts are the same.

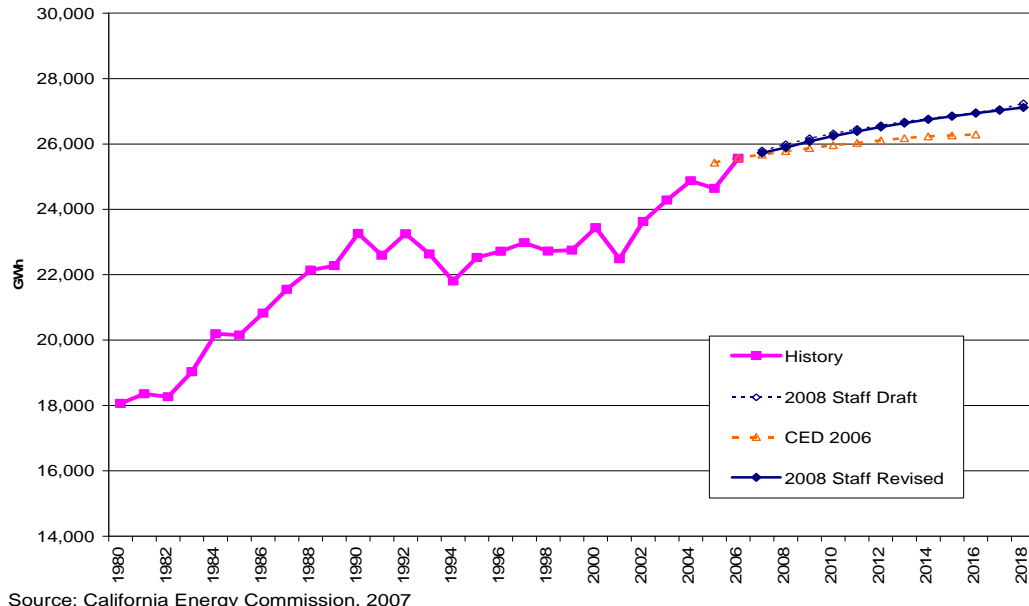
Table 30: LADWP Planning Area Peak Forecast Comparison

Peak (MW)					
	CED 2006	Staff Draft	Staff Revised	Percent Difference Staff Revised/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	5,281	5,326	5,326	0.86%	0.00%
2000	5,330	5,325	5,325	-0.08%	0.00%
2005	5,744	5,725	5,725	-0.33%	0.00%
2008	5,819	5,872	5,717	-1.74%	-2.63%
2013	5,903	6,005	5,863	-0.67%	-2.36%
2016	5,927	6,063	5,928	0.01%	-2.22%
Average Annual Growth Rates					
1990-2000	0.09%	0.00%	0.00%		
2000-2005	1.51%	1.46%	1.46%		
2005-2008	0.43%	0.85%	-0.05%		
2008-2016	0.23%	0.40%	0.45%		
Historic values are shaded					

Source: California Energy Commission, 2007.

As shown in **Figure 120**, the revised 2008 electricity consumption forecast is essentially the same as the draft 2008 forecast. Both the revised and draft 2008 energy consumption forecasts grow at a faster rate than the *CED 2006* energy forecast.

Figure 120: LADWP Planning Area Electricity Forecast



The LADWP planning area peak demand forecasts are shown in **Figure 121**. As opposed to the differences in electricity consumption forecasts, the revised 2008 forecast is lower than the draft 2008 forecast and is now very similar to the *CED 2006* forecast. This is caused by using a shorter calibration period for the peak forecasting model. The revised forecast was calibrated to 1990–2006; in the draft 2008 forecast the years 1980–2006 were used. The earlier period was dropped from calibration because of the shift to climate zone forecasts; historic data at climate zone level are not yet available for the 1980–1990 period. Also contributing to the difference is a slight shift in the sector composition of peak use.

Figure 121: LADWP Planning Area Peak

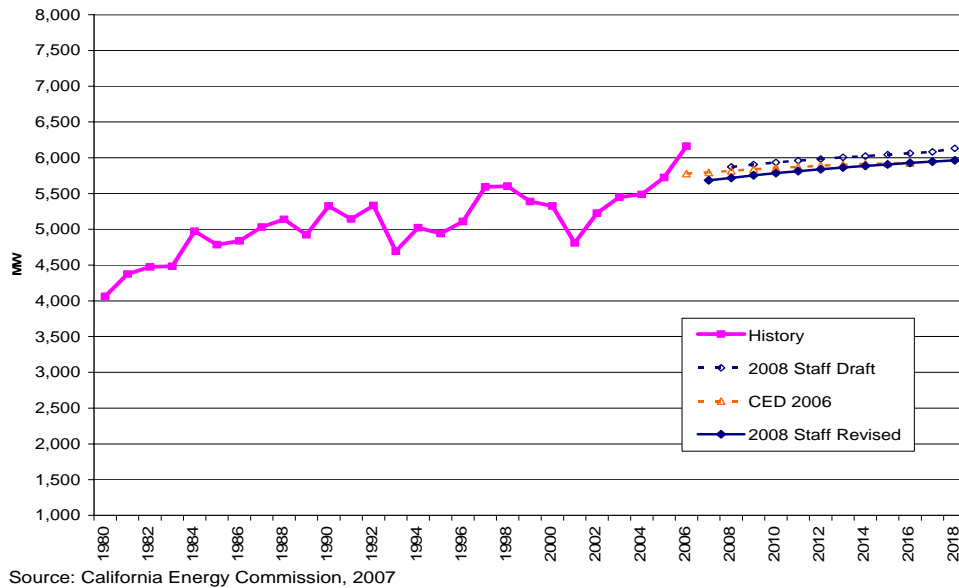
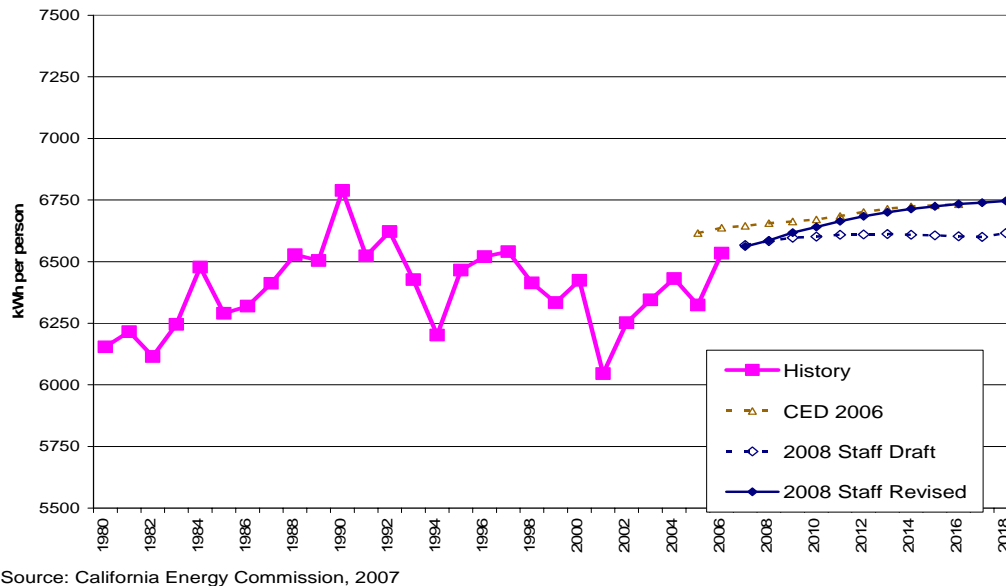


Figure 122 compares LADWP planning area per capita electricity consumption between the revised 2008 forecast and previous forecasts. Use of the new long-term Department of Finance (DOF) population forecast reduced projected population estimates for the LADWP planning area over the forecast period. This had the effect of raising per capita consumption in the revised 2008 forecast.

Figure 122: LADWP Planning Area per Capita Electricity Consumption



Per capita peak demand, shown in **Figure 123**, is slightly lower than projected in the *CED 2006* forecast. The draft 2008 projection remains constant over the forecast period.

Figure 123: LADWP Planning Area per Capita Peak Demand

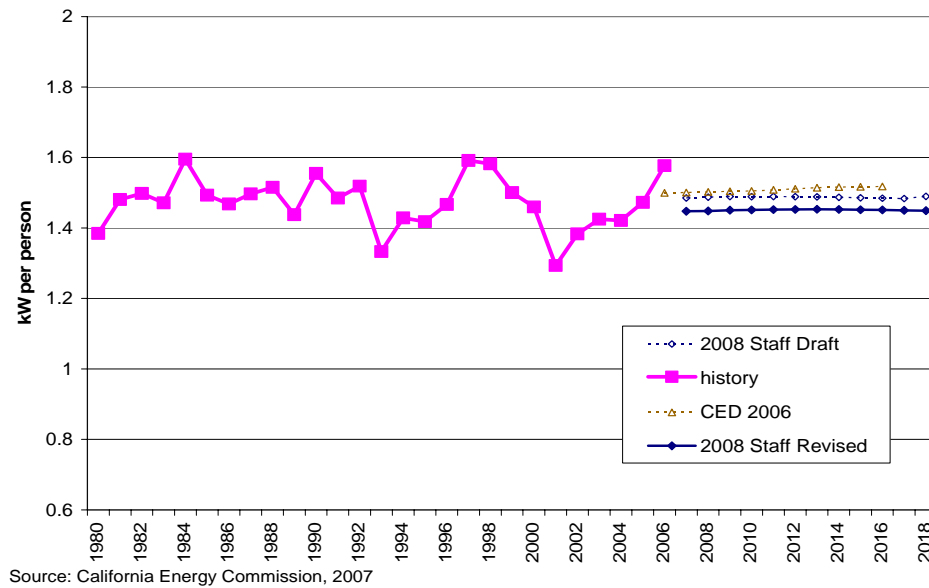
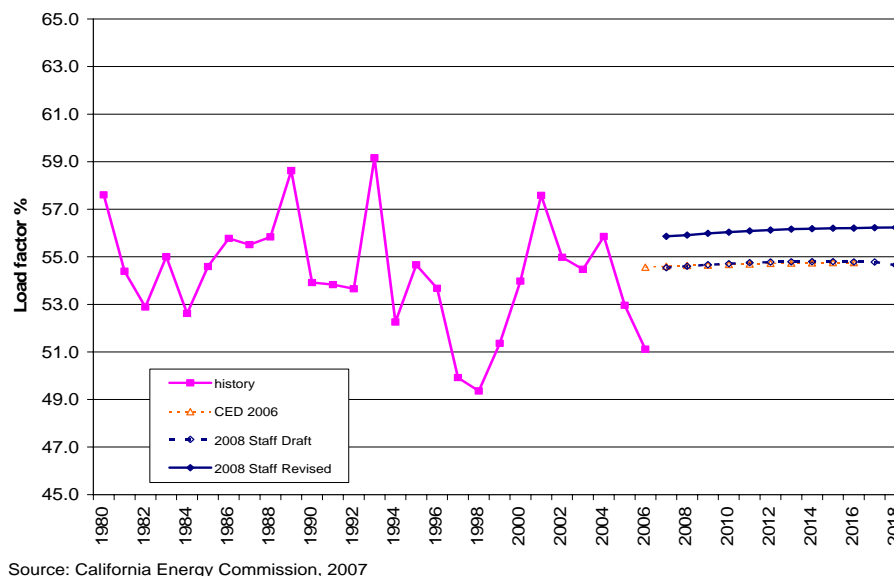


Figure 124 provides a comparison of the respective load factors. The load factor is a measure of the relative increase in peak demand with respect to annual electricity consumption. The revised 2008 projected load factor is higher than the projected load factors of the previous two forecasts because of the shorter calibration period and because non-weather-sensitive end-use electricity is a higher percentage of total end-use load; commercial load is lower, while industrial is higher. The load factor is relatively constant over the forecast period. This trend is unchanged from the previous forecast.

Figure 124: LADWP Planning Area Load Factor

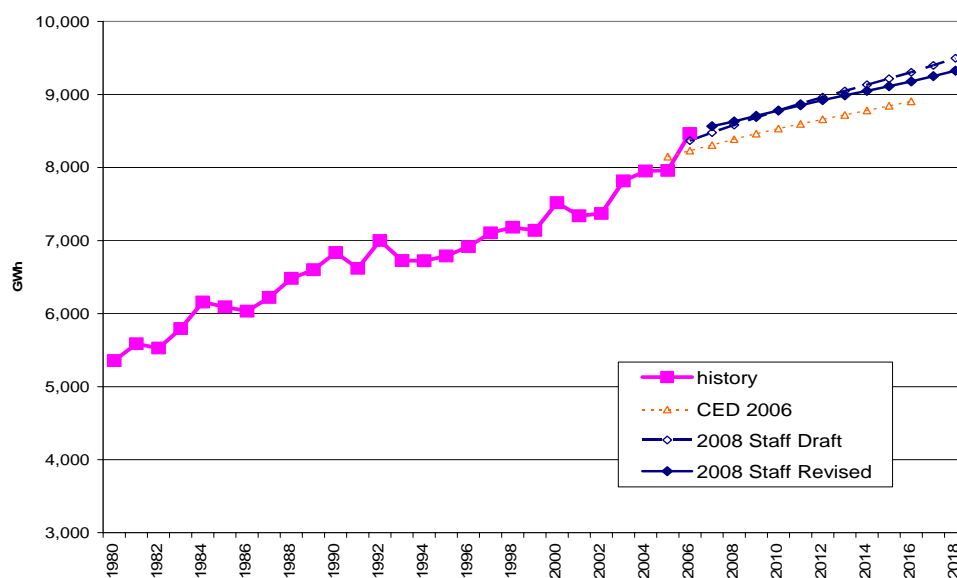


Sector Level Results and Input Assumptions

Residential

Figure 125 provides a comparison between the revised 2008 forecast and previous staff residential forecasts for the LADWP planning area. The revised 2008 forecast has a slightly higher starting point than the draft 2008 forecast, but is projected to grow at a lower rate due to decreased economic and demographic projections. The result is a slightly lower forecast by the end of the forecast period. Both the revised and draft 2008 forecasts are higher than was projected in the *CED 2006* forecast.

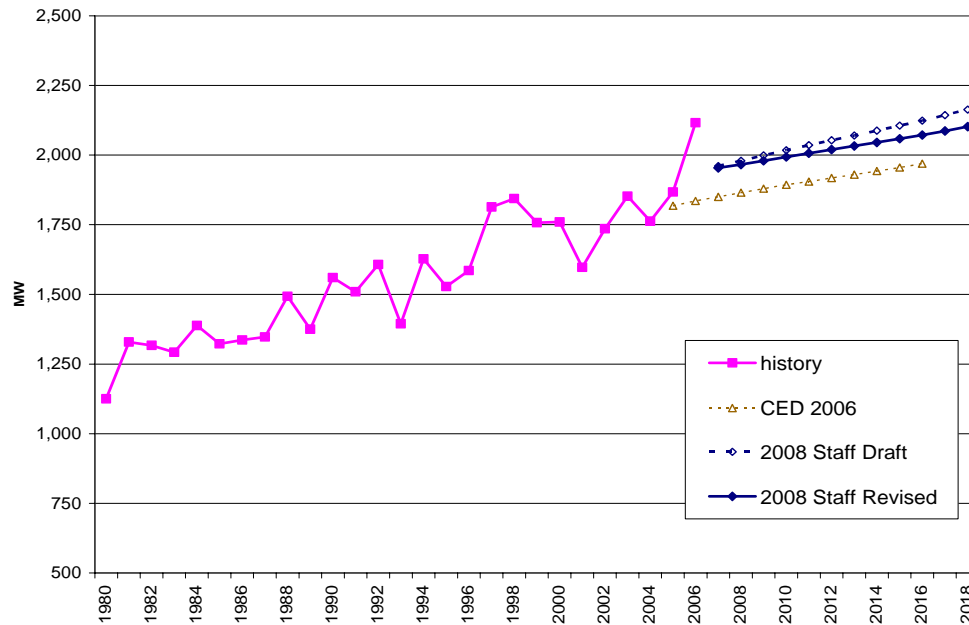
Figure 125: LADWP Planning Area Residential Consumption



Source: California Energy Commission, 2007.

Figure 126 compares the revised 2008 residential peak demand forecast and previous residential peak demand forecasts. The peak forecast differences mirror the difference in electricity consumption forecasts. Unlike the electricity consumption forecasts, the revised and draft 2008 forecasts start from the same point. The revised 2008 forecast then grows at a slower rate resulting in a lower forecast by the end of the forecast period. Note that the 2007 peak projection is substantially below the actual 2006 peak value, which occurred during the July 2006 heat storm and was an all-time record for the LADWP planning area. The forecast for 2007 and future years assumes a return to average, or 1-in-2, peak temperature conditions.

Figure 126: LADWP Planning Area Residential Peak



Source: California Energy Commission, 2007.

Figures 127 and 128 compare the residential drivers used in the revised 2008 forecast with those used in the draft 2008 forecast. For both forecasts, staff revised the method for allocating Los Angeles County population, housing, and income data to the five utility service areas providing electricity within the county—SCE; the cities of Burbank, Glendale, and Pasadena; and LADWP. Previously unavailable sources of information, such as websites for the cities of Glendale and Los Angeles, and the County of Los Angeles, provided substantial insight into population shifts within the area. The result of this revision is to allocate slightly less of the county's population to LADWP, but a higher proportion of homes to the warmer valley area and fewer in the coastal region. Also, a higher proportion of the county's personal income is assumed for the residents of Burbank, Glendale, and Pasadena than in previous staff forecasts.

Figure 128 provides comparisons of total population, total households, and persons per household projections. The revised 2008 forecast of total population is lower throughout the forecast period than the *CED 2006* forecast due to inclusion of the July 2007 DOF population forecast used as a new county control total in calculating the LADWP planning area population and household forecast.

For the draft forecast, staff reduced previous assumptions of increasing persons per household to a rate approximately half of the increase seen in the 1990–2000 period. Staff's revised 2008 projections of persons per household are higher than the draft 2008 forecast, based on 2005 and 2006 higher population and housing estimates provided by the DOF E5-A reports. This yields a forecast of household growth that is slightly lower than the draft 2008 forecast.

Figure 127: LADWP Planning Area Residential Demographic Projections

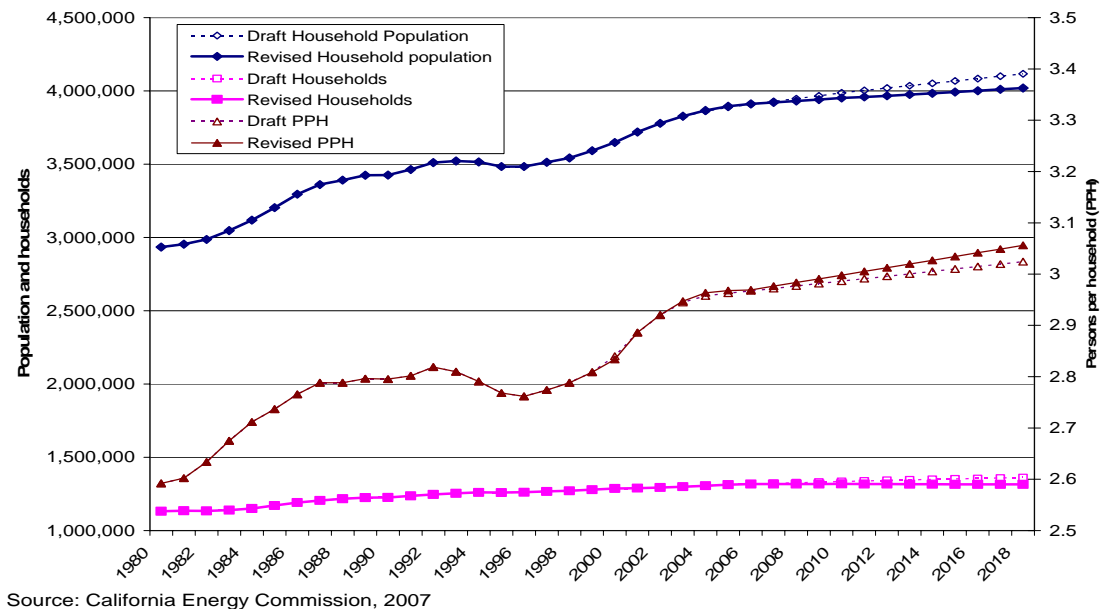


Figure 128 provides a comparison of household income between the two forecasts. Household income is derived as the product of per capita income and persons per household. The revised 2008 projection is lower throughout the forecast period than the draft 2008 forecast. This is caused by both lower household projections described above and revised personal income projections, which are also slightly lower.

Figure 128: LADWP Planning Area Household Income Projections

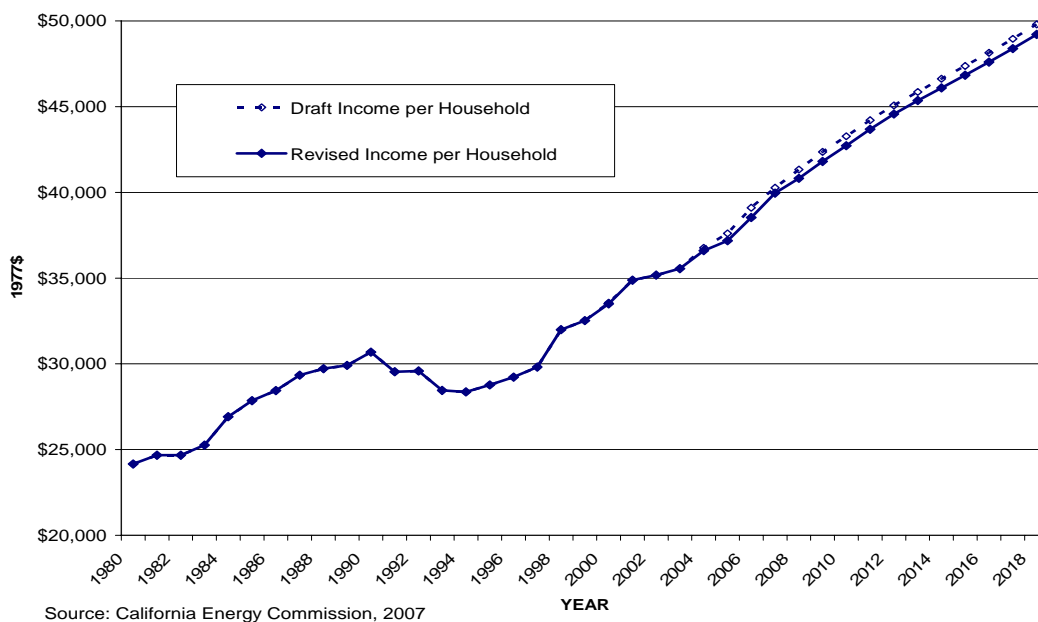
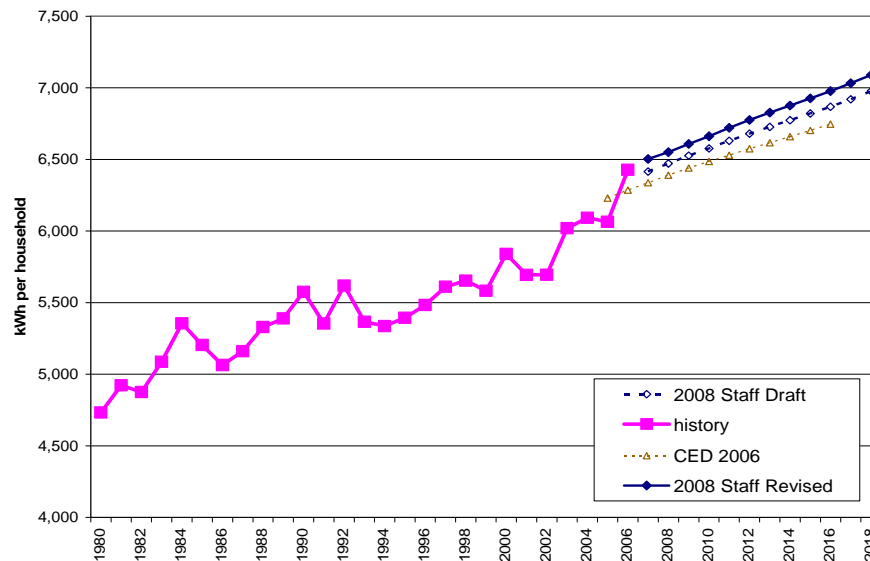


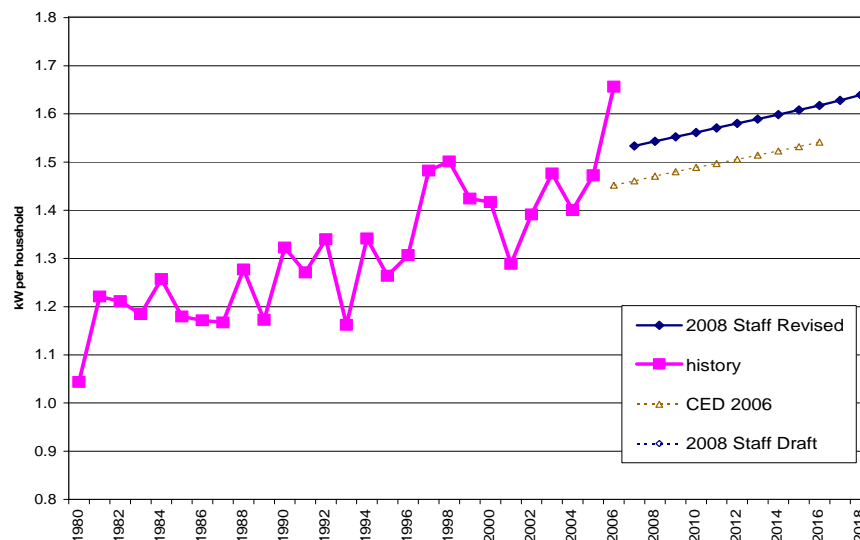
Figure 129 presents a comparison of electricity use per household between the forecasts as well as the 1980–2005 historic series. The revised 2008 forecast of use per household is higher than the draft 2008 forecast due to higher persons per household projections. However, there is no discernable difference in the revised and draft 2008 projections of peak use per household, as seen in **Figure 130**.

Figure 129: LADWP Planning Area Use per Household



Source: California Energy Commission, 2007.

Figure 130: LADWP Planning Area Peak Use per Household

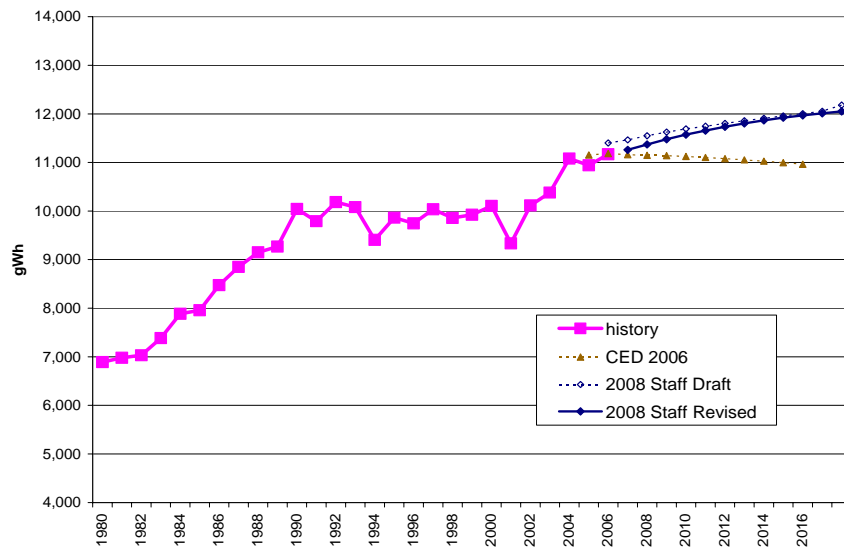


Source: California Energy Commission, 2007.

Commercial Building Sector

Figure 131 compares the commercial building sector energy consumption forecasts. The revised 2008 forecast is slightly lower at the beginning of the forecast, but grows at a faster rate than the draft 2008 forecast. This results in the two forecasts being almost identical by the end of the forecast period.

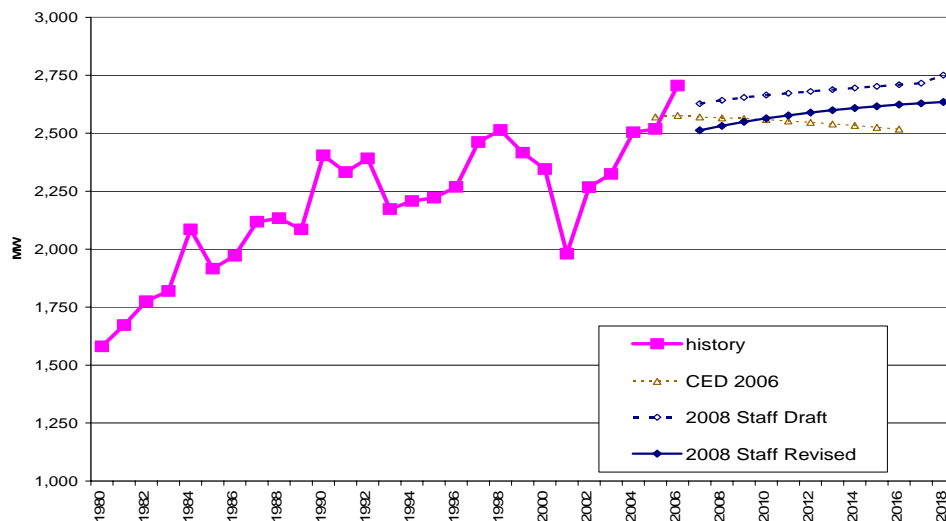
Figure 131: LADWP Planning Area Commercial Consumption



Source: California Energy Commission, 2007.

Figure 132 provides a comparison of the commercial peak demand forecasts. The revised *CED 2006* forecast is lower throughout the forecast period due to a lower starting value. The difference in peak forecasts is primarily due to the difference in the time periods used in calibration and the underlying electricity forecasts.

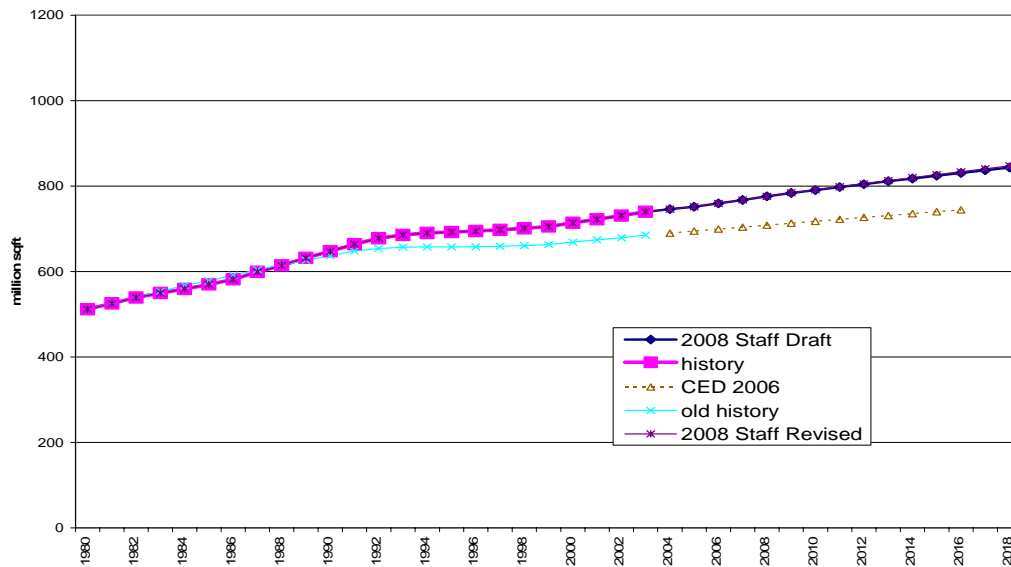
Figure 132: LADWP Planning Area Commercial Sector Peak



Source: California Energy Commission, 2007.

In staff's commercial building sector forecasting model, floor space by building type (for example, retail, offices, and schools) is the key driver of energy demand trends. The commercial building floor space forecast is based on the historic trend of additions in the LADWP planning area. **Figure 133** provides a comparison of total commercial floor space projections. For the LADWP planning area, the revised 2008 floor space projections are essentially the same as the draft 2008 forecast. Both forecasts are higher than the *CED 2006* floor space projections because of changes in estimation methodology.

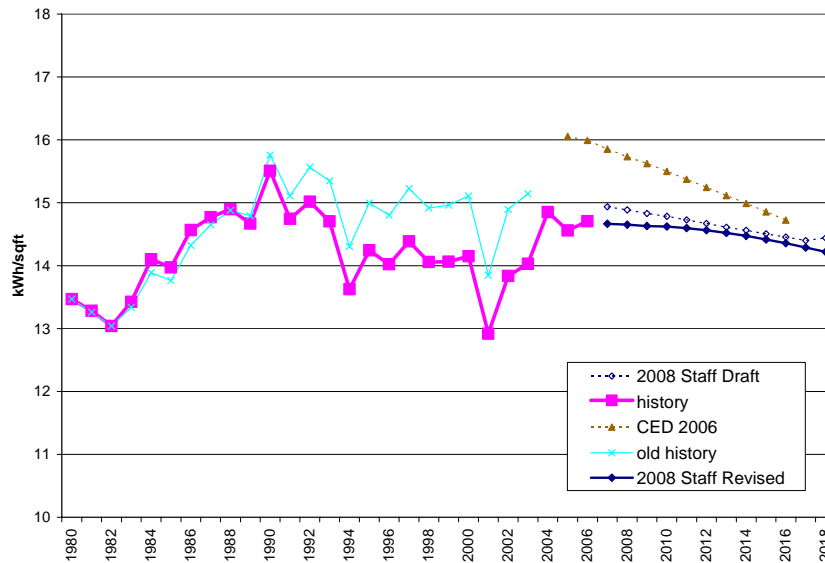
Figure 133: LADWP Planning Area Commercial Floor Space



Source: California Energy Commission, 2007.

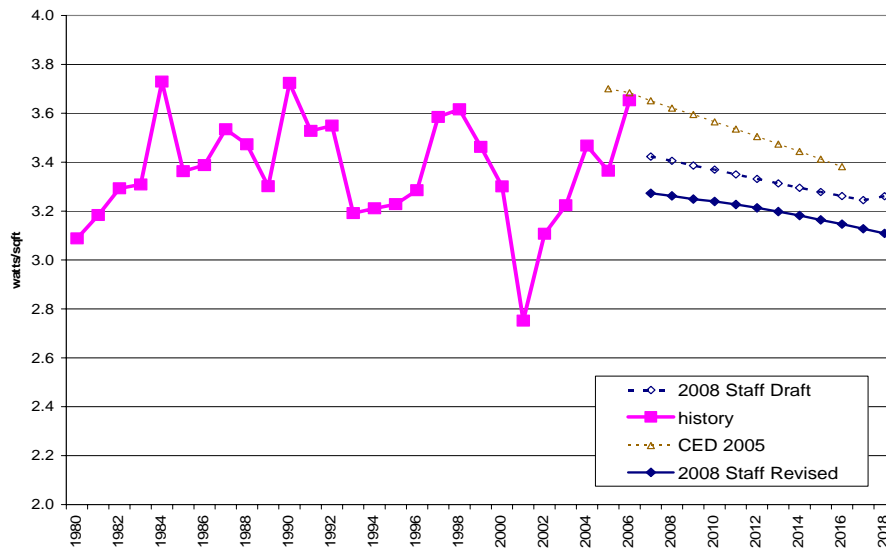
Comparisons of use per square foot over the forecast period are shown in **Figures 134** and **135** for electricity consumption and peak, respectively. The revised 2008 forecast shows a decline in use per square foot in both electricity consumption and peak, although not as steeply as in the *CED 2006* forecast. This decline is a result of an increasing proportion of new floor space with more efficient end use intensities.

Figure 134: LADWP Planning Area Commercial kWh per Square Foot



Source: California Energy Commission, 2007.

Figure 135: LADWP Planning Area Commercial Watts per Square Foot



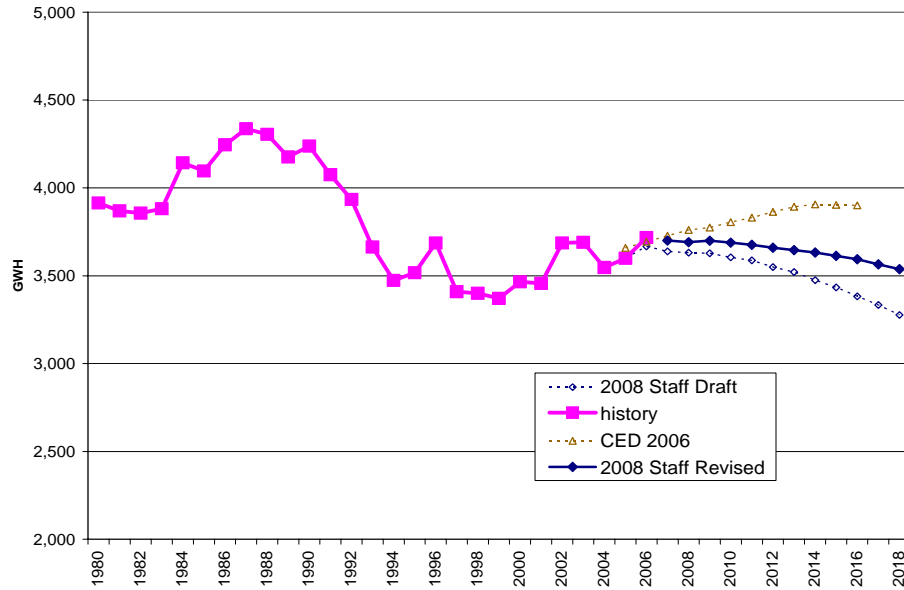
Source: California Energy Commission, 2007.

Industrial Sector

Figure 136 compares the LADWP planning area industrial sector electricity consumption forecasts. The revised 2008 industrial electricity consumption forecast is higher than the draft 2008 forecast. The revised 2008 forecast also declines at a lower rate than the draft 2008 forecast because of the revised economic drivers discussed earlier. This produces a somewhat higher industrial forecast by the end of the forecast period. However, the revised 2008 forecast is still well below the *CED*

2006 forecast. The growth rate of the *CED 2006* industrial drivers was 0.7 percent, compared to -0.9 percent assumed in the revised forecast.

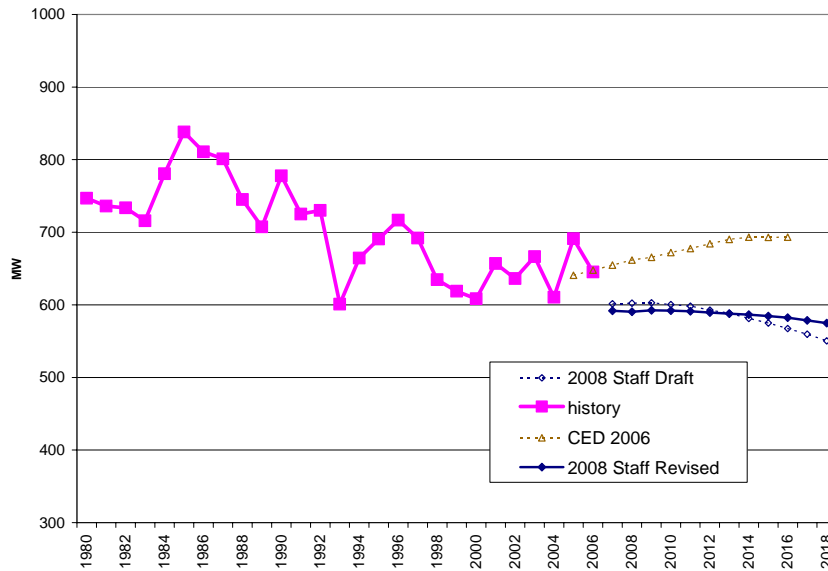
Figure 136: LADWP Planning Area Industrial Consumption



Source: California Energy Commission, 2007.

Figure 137 compares the industrial sector peak forecasts. The revised 2008 forecast starts from a slightly lower point due to revisions in calibration as noted earlier in this chapter. The revised 2008 forecast is more constant over the forecast period resulting in a higher forecast by the end of the forecast period.

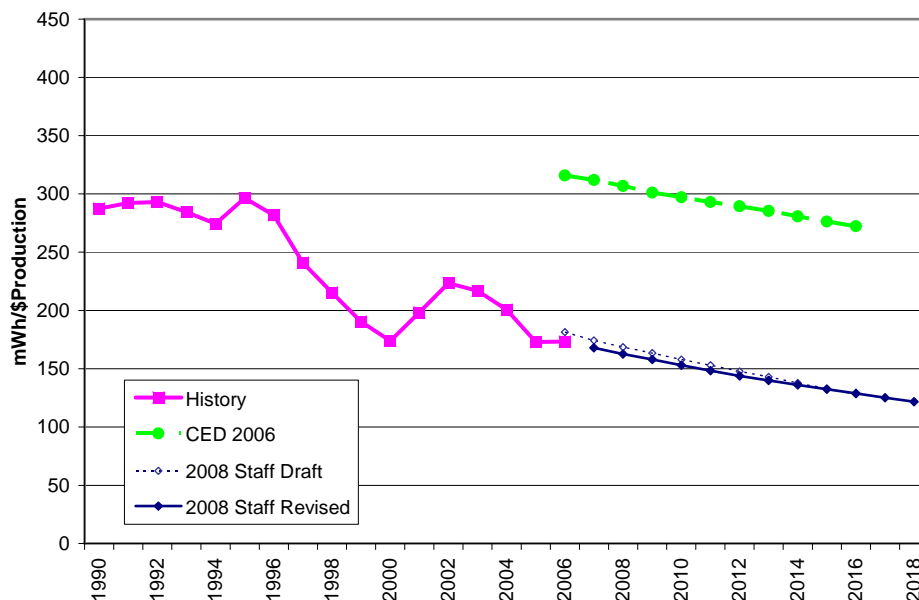
Figure 137: LADWP Planning Area Industrial Sector Peak



Source: California Energy Commission, 2007.

Figure 138 compares use-per-dollar value of production between the revised 2008 forecast and previous forecasts. The revised 2008 forecast declines at a slightly lower rate than the draft 2008 forecast. Because of definitional changes in the sectors and revisions to historic data, the revised and *CED 2006* data are not comparable. However, it is the change in trend that affects the final calibrated forecasts.

Figure 138: LADWP Planning Area Industrial Use per Production Unit

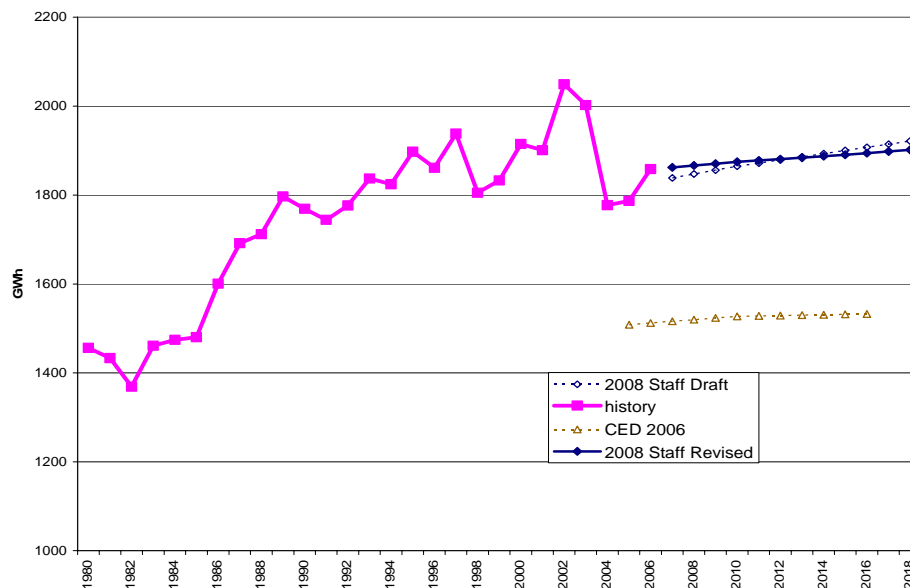


Source: California Energy Commission, 2007.

Other Sectors

Figures 139 and 140 provide comparisons of the two remaining customer sector electricity consumption forecasts. Figure 140 compares the transportation, communication, and utilities sector forecasts. The revised 2008 forecast has a slightly higher starting point than the draft 2008 forecast because of the inclusion of 2006 consumption. This starting point is much higher than in the *CED 2006* forecast because unclassified sales were allocated to sectors differently in the current forecast. The growth rate of the revised 2008 forecast is lower than that of the draft 2008 forecast because of lower population projections used in the revised 2008 forecast. This results in the revised 2008 forecast being lower by the end of the forecast period.

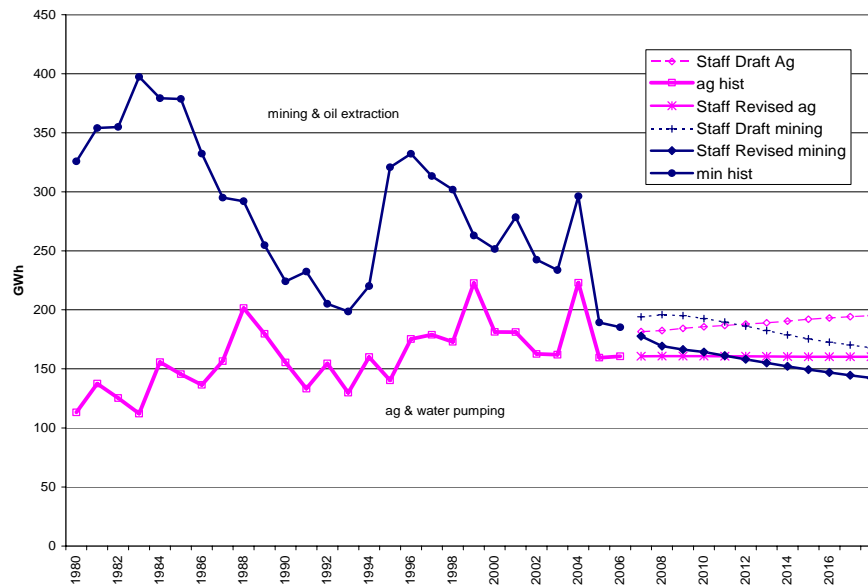
Figure 139: LADWP Planning Area Transportation, Communication, and Utilities Sector Electricity Consumption



Source: California Energy Commission, 2007.

Figure 141 compares forecasts for the agriculture and water pumping and mining and oil extraction sectors. The draft 2008 mining and oil extraction forecast is projected to decline over the forecast period, while the agriculture and water pumping forecast is projected to increase. The decrease in the mining and oil extraction industry reflects projected decreases in production and changes in intensity assumptions. The increase in the agriculture and water pumping sector is caused by increased water demands. The previous forecasts had very different starting points because of the method of allocation of unclassified electricity sales to sectors.

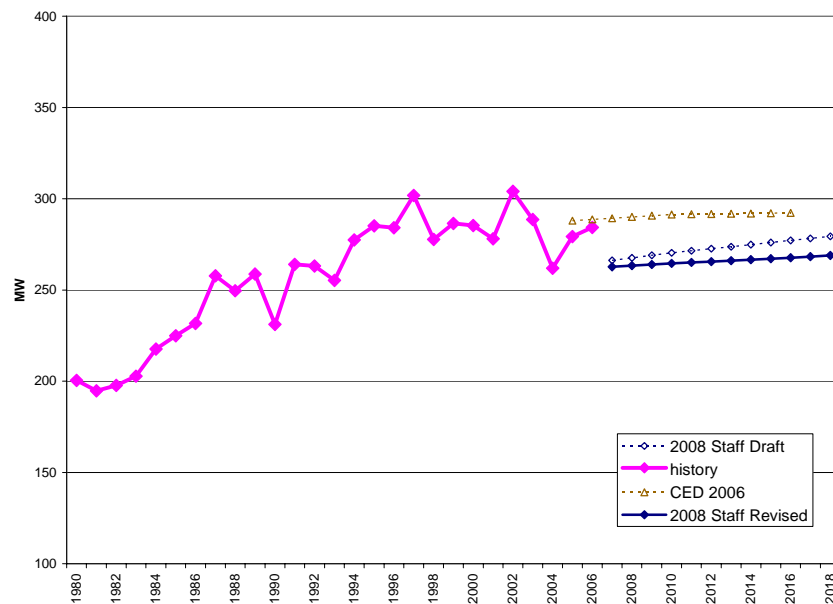
Figure 140: LADWP Planning Area Agriculture and Water Pumping and Mining and Oil Extraction Electricity Consumption Forecasts



Source: California Energy Commission, 2007.

Figure 141 compares the combined peaks of other sectors. The revised 2008 forecast is slightly lower than the draft 2008 forecast. The lower growth in the revised 2008 forecast is caused by the growth of the underlying electricity forecasts.

Figure 141: LADWP Planning Area Other Sector Peak



Source: California Energy Commission, 2007.

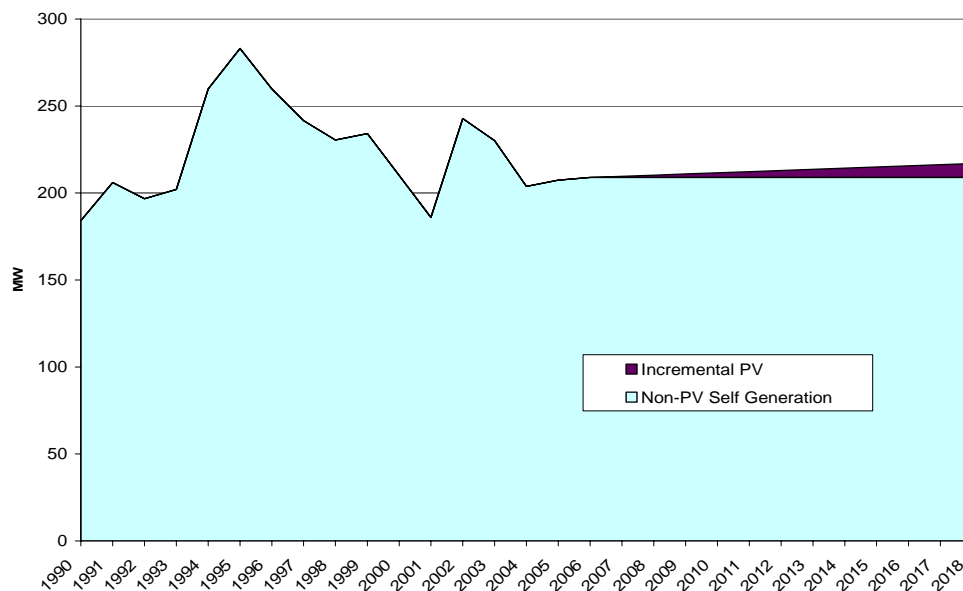
Electricity Prices

As in the draft forecast, the revised 2008 forecast used prices which are held constant (in real terms) at the 2005 level for all sectors. This is in contrast to the declining price forecast which was used in the *CED 2006* price forecast.

Self-Generation

As discussed in Chapter 1, the peak demand forecast is reduced by the staff's estimate of the effects of programs to promote photovoltaic (PV) and other self-generation installations. The forecast of peak PV impacts, shown in **Figure 142**, represents incremental installations from 2007 forward. The forecast assumes about 1,200 kW of new installed capacity per year, for a coincident peak reduction of 675 kW per year. The cumulative forecast is shown in Forms 1.2 and 1.4 following this chapter.

Figure 142: LADWP Planning Area Self Generation Forecast



Conservation Savings Embedded in the Forecast

As discussed in Chapter 1, savings from building and appliance standards through 2005 are modeled in the Energy Commission residential and commercial demand forecast models. Savings from historic public agency and utility programs funded through 2008 are also included in the forecast. To estimate the magnitude of these savings, the models are run without these programs—in effect in the chronological order of the programs' occurrence. The savings are then calculated by subtracting the results of the run with the program in effect from the results without the program in effect. A condensed version of the results of this analysis is presented here as a partial estimate of savings, which are embedded in the forecast. **Table 31** presents electricity consumption savings, by broad program category, for selected years.

Table 32 presents similar estimates of peak savings. These tables do not quantify the effects of decreasing energy intensity (whether market- or program-driven) in other sectors.

Table 31: LADWP Planning Area Electricity Conservation Savings Estimates

	1990	2000	2005	2008	2013	2018
Residential Energy Savings (GWH)						
Building Standards	228	289	310	331	356	385
Appliance Standards	209	679	919	1027	1160	1251
Utility and Public Agency Programs	31	53	34	25	31	33
Market and Price Effects	4	6	6	6	7	7
Total Residential Savings	472	1028	1269	1389	1553	1676
Commercial Energy Savings (GWH)						
Building Standards	149	355	523	660	890	1125
Appliance Standards	100	233	333	409	527	643
Utility and Public Agency Programs	36	8	1	0	0	0
Market and Price Effects	1049	1067	674	650	719	748
Total Commercial Savings	1334	1663	1532	1718	2137	2517
Total Energy Savings	1806	2691	2801	3108	3690	4193

Source: California Energy Commission, 2007

Table 32: LADWP Planning Area Peak Conservation Savings Estimates

	1990	2000	2005	2008	2013	2018
Residential Energy Savings (MW)						
Building Standards	146	183	196	201	201	206
Appliance Standards	27	88	120	134	151	163
Utility and Public Agency Programs	10	19	12	8	10	11
Market and Price Effects	1	1	1	1	2	2
Total Residential Savings	184	292	329	344	363	381
Commercial Energy Savings (GWH)						
Building Standards	34	82	120	152	205	259
Appliance Standards	23	54	77	94	121	148
Utility and Public Agency Programs	7	2	0	0	0	0
Market and Price Effects	241	245	155	149	165	172
Total Commercial Savings	305	382	352	395	491	579
Total Energy Savings	490	674	681	739	855	960

Source: California Energy Commission, 2007

Form 1.1 - LADWP Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Electricity Consumption by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1980	5,357	6,894	3,914	326	113	1,113	343	18,059
1981	5,587	6,979	3,869	354	137	1,083	350	18,359
1982	5,529	7,032	3,855	355	125	1,023	346	18,265
1983	5,794	7,383	3,881	397	112	1,119	343	19,029
1984	6,157	7,886	4,142	379	156	1,146	328	20,195
1985	6,092	7,960	4,096	379	145	1,172	309	20,152
1986	6,033	8,475	4,245	332	137	1,298	303	20,822
1987	6,222	8,850	4,337	295	157	1,395	297	21,552
1988	6,482	9,151	4,304	292	202	1,415	297	22,143
1989	6,601	9,268	4,175	255	180	1,505	292	22,276
1990	6,835	10,042	4,237	224	156	1,479	290	23,263
1991	6,620	9,791	4,075	232	133	1,452	292	22,595
1992	7,000	10,183	3,934	205	155	1,487	290	23,253
1993	6,726	10,080	3,663	199	130	1,548	289	22,635
1994	6,723	9,405	3,473	220	160	1,535	289	21,805
1995	6,788	9,862	3,517	321	140	1,607	290	22,526
1996	6,917	9,744	3,686	332	175	1,569	292	22,715
1997	7,106	10,035	3,409	313	179	1,643	296	22,980
1998	7,183	9,857	3,399	302	173	1,509	296	22,719
1999	7,140	9,922	3,371	263	223	1,549	284	22,751
2000	7,519	10,105	3,465	252	181	1,631	284	23,437
2001	7,339	9,334	3,456	278	181	1,603	298	22,489
2002	7,370	10,115	3,686	242	163	1,763	287	23,625
2003	7,818	10,379	3,690	234	162	1,697	305	24,285
2004	7,951	11,081	3,547	296	223	1,466	311	24,875
2005	7,961	10,942	3,599	189	159	1,473	314	24,638
2006	8,467	11,170	3,717	185	161	1,566	293	25,558
2007	8,570	11,286	3,700	178	161	1,569	293	25,757
2008	8,635	11,399	3,691	169	161	1,573	293	25,921
2009	8,712	11,505	3,699	166	161	1,578	293	26,113
2010	8,785	11,600	3,688	164	161	1,582	293	26,273
2011	8,858	11,682	3,676	161	161	1,585	293	26,416
2012	8,929	11,762	3,659	158	161	1,588	293	26,550
2013	8,992	11,833	3,645	155	161	1,591	293	26,670
2014	9,054	11,895	3,632	152	160	1,595	293	26,780
2015	9,117	11,949	3,613	149	160	1,598	293	26,879
2016	9,184	11,998	3,594	147	160	1,602	293	26,977
2017	9,255	12,040	3,565	145	160	1,605	293	27,064
2018	9,331	12,081	3,538	142	160	1,609	293	27,154

Annual Growth Rates (%)

1980-1990	2.5	3.8	0.8	-3.7	3.2	2.9	-1.7	2.6
1990-2000	1.0	0.1	-2.0	1.2	1.5	1.0	-0.2	0.1
2000-2006	2.0	1.7	1.2	-5.0	-2.0	-0.7	0.5	1.5
2006-2011	0.9	0.9	-0.2	-2.7	0.0	0.2	0.0	0.7
2011-2018	0.7	0.5	-0.5	-1.8	0.0	0.2	0.0	0.4
2006-2018	0.8	0.7	-0.4	-2.2	0.0	0.2	0.0	0.5

Form 1.1b - LADWP Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Electricity Sales by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1990	6,835	10,004	3,366	224	156	1,291	290	22,166
1991	6,620	9,736	3,090	232	133	1,264	292	21,368
1992	7,000	10,118	3,001	205	155	1,313	290	22,081
1993	6,726	10,013	2,707	199	130	1,368	289	21,432
1994	6,723	9,121	2,402	220	160	1,342	289	20,258
1995	6,788	9,527	2,395	321	140	1,379	290	20,839
1996	6,917	9,471	2,504	332	175	1,476	292	21,168
1997	7,106	9,735	2,369	313	179	1,544	296	21,541
1998	7,183	9,555	2,359	302	173	1,478	296	21,346
1999	7,140	9,618	2,290	263	223	1,539	284	21,357
2000	7,519	9,810	2,515	252	181	1,625	284	22,186
2001	7,339	9,102	2,579	278	181	1,603	298	21,381
2002	7,370	9,849	2,558	242	163	1,710	287	22,179
2003	7,818	10,089	2,608	234	162	1,697	305	22,914
2004	7,951	10,832	2,581	296	223	1,466	311	23,661
2005	7,961	10,687	2,619	189	159	1,473	314	23,403
2006	8,467	10,967	2,675	185	161	1,566	293	24,314
2007	8,570	11,081	2,659	178	161	1,569	293	24,511
2008	8,634	11,193	2,650	169	161	1,573	293	24,673
2009	8,711	11,297	2,658	166	161	1,578	293	24,863
2010	8,784	11,391	2,646	164	161	1,582	293	25,022
2011	8,857	11,472	2,634	161	161	1,585	293	25,163
2012	8,927	11,550	2,618	158	161	1,588	293	25,295
2013	8,991	11,619	2,604	155	161	1,591	293	25,413
2014	9,052	11,680	2,590	152	160	1,595	293	25,522
2015	9,115	11,732	2,572	149	160	1,598	293	25,619
2016	9,181	11,780	2,552	147	160	1,602	293	25,715
2017	9,252	11,821	2,524	145	160	1,605	293	25,800
2018	9,328	11,860	2,496	142	160	1,609	293	25,889

Annual Growth Rates (%)

1980-1990	2.5	3.8	-1.5	-3.7	3.2	1.5	-1.7	2.1
1990-2000	1.0	-0.2	-2.9	1.2	1.5	2.3	-0.2	0.0
2000-2006	2.0	1.9	1.0	-5.0	-2.0	-0.6	0.5	1.5
2006-2011	0.9	0.9	-0.3	-2.7	0.0	0.2	0.0	0.7
2011-2018	0.7	0.5	-0.8	-1.8	0.0	0.2	0.0	0.4
2006-2018	0.8	0.7	-0.6	-2.2	0.0	0.2	0.0	0.5

Form 1.2 - LADWP
California Energy Demand 2008-2018 Staff Revised Forecast
Net Energy for Load (GWh)

Year	Total Consumption	Net Losses	Gross Generation	Non-PV Self Generation	Incremental PV	Total Private Supply	Net Energy for Load
1980	18,059	2,438	20,497	0	0	0	20,497
1981	18,359	2,479	20,838	0	0	0	20,838
1982	18,265	2,466	20,731	0	0	0	20,731
1983	19,029	2,569	21,598	0	0	0	21,598
1984	20,195	2,726	22,921	0	0	0	22,921
1985	20,152	2,721	22,873	0	0	0	22,873
1986	20,822	2,811	23,633	0	0	0	23,633
1987	21,552	2,910	24,462	0	0	0	24,462
1988	22,143	2,989	25,132	0	0	0	25,132
1989	22,276	3,007	25,283	0	0	0	25,283
1990	23,263	2,992	26,255	1,097	0	1,097	25,159
1991	22,595	2,885	25,480	1,227	0	1,227	24,253
1992	23,253	2,981	26,234	1,172	0	1,172	25,062
1993	22,635	2,893	25,529	1,204	0	1,204	24,325
1994	21,805	2,735	24,540	1,548	0	1,548	22,993
1995	22,526	2,813	25,339	1,686	0	1,686	23,653
1996	22,715	2,858	25,573	1,548	0	1,548	24,025
1997	22,980	2,908	25,888	1,439	0	1,439	24,449
1998	22,719	2,882	25,601	1,373	0	1,373	24,228
1999	22,751	2,883	25,635	1,395	0	1,395	24,240
2000	23,437	2,995	26,432	1,251	0	1,251	25,181
2001	22,489	2,886	25,375	1,108	0	1,108	24,267
2002	23,625	2,994	26,620	1,446	0	1,446	25,173
2003	24,285	3,093	27,378	1,371	0	1,371	26,007
2004	24,875	3,194	28,069	1,214	0	1,214	26,855
2005	24,638	3,159	27,798	1,236	0	1,236	26,562
2006	25,558	3,282	28,840	1,245	0	1,245	27,596
2007	25,757	3,309	29,067	1,245	2	1,246	27,820
2008	25,921	3,331	29,252	1,245	3	1,248	28,004
2009	26,113	3,357	29,471	1,245	5	1,250	28,221
2010	26,273	3,379	29,652	1,245	7	1,252	28,401
2011	26,416	3,398	29,815	1,245	9	1,253	28,561
2012	26,550	3,416	29,966	1,245	10	1,255	28,711
2013	26,670	3,432	30,102	1,245	12	1,257	28,846
2014	26,780	3,447	30,228	1,245	14	1,259	28,969
2015	26,879	3,461	30,340	1,245	16	1,260	29,080
2016	26,977	3,474	30,451	1,245	17	1,262	29,189
2017	27,064	3,486	30,549	1,245	19	1,264	29,286
2018	27,154	3,498	30,652	1,245	21	1,266	29,386

Annual Growth Rates (%)

1980-1990	2.6	2.1	2.5				2.1
1990-2000	0.1	0.0	0.1	1.3		1.3	0.0
2000-2006	1.5	1.5	1.5	-0.1		-0.1	1.5
2006-2011	0.7	0.7	0.7	0.0		0.1	0.7
2011-2018	0.4	0.4	0.4	0.0	13.3	0.1	0.4
2006-2018	0.5	0.5	0.5	0.0		0.1	0.5

Form 1.3 - LADWP Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Coincident Peak Demand by Sector (MW)

Year	Residential	Commercial	Industrial	Agricultural	Other	Total Demand
1980	1,125	1,581	747	8	192	3,653
1981	1,329	1,673	736	10	185	3,933
1982	1,317	1,776	734	11	187	4,024
1983	1,292	1,820	716	9	194	4,031
1984	1,388	2,085	781	13	205	4,472
1985	1,322	1,916	838	11	214	4,301
1986	1,336	1,971	811	10	222	4,350
1987	1,347	2,118	801	13	245	4,524
1988	1,493	2,133	745	16	234	4,621
1989	1,375	2,086	708	14	245	4,427
1990	1,560	2,405	778	11	220	4,974
1991	1,510	2,332	725	11	253	4,831
1992	1,607	2,391	730	11	252	4,992
1993	1,394	2,172	601	10	246	4,423
1994	1,627	2,207	664	12	266	4,776
1995	1,528	2,222	691	10	275	4,725
1996	1,585	2,269	717	13	271	4,855
1997	1,814	2,462	692	13	289	5,270
1998	1,844	2,513	635	14	263	5,270
1999	1,758	2,416	619	18	268	5,079
2000	1,760	2,345	609	14	271	4,999
2001	1,597	1,980	657	13	265	4,512
2002	1,736	2,267	636	13	291	4,943
2003	1,852	2,324	666	12	277	5,131
2004	1,763	2,504	611	20	242	5,139
2005	1,867	2,518	691	12	267	5,356
2006	2,116	2,706	645	13	271	5,751
2007	1,954	2,513	592	12	251	5,322
2008	1,966	2,532	590	12	251	5,352
2009	1,980	2,549	593	12	252	5,385
2010	1,994	2,564	592	12	252	5,414
2011	2,007	2,577	591	12	253	5,440
2012	2,020	2,589	589	12	253	5,464
2013	2,033	2,599	588	12	254	5,486
2014	2,045	2,609	587	12	255	5,507
2015	2,059	2,616	585	12	255	5,526
2016	2,072	2,624	582	12	256	5,546
2017	2,087	2,629	579	12	256	5,563
2018	2,103	2,635	575	12	257	5,581

Annual Growth Rates (%)

1980-1990	3.3	4.3	0.4	3.0	1.4	3.1
1990-2000	1.2	-0.3	-2.4	2.5	2.1	0.1
2000-2006	3.1	2.4	1.0	-1.3	0.0	2.4
2006-2011	-1.1	-1.0	-1.7	-1.6	-1.4	-1.1
2011-2018	0.7	0.3	-0.4	0.0	0.2	0.4
2006-2018	-0.1	-0.2	-1.0	-0.7	-0.5	-0.3

Form 1.4 - LADWP Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Peak Demand (MW)

Year	Total End Use Load	Net Losses	Gross Generation	Non-PV Self Generation	Incremental PV	Total Private Supply	Net Peak Demand	Load Factor (%)
1980	3,653	409	4,062	0	0	0	4,062	58
1981	3,933	440	4,373	0	0	0	4,373	54
1982	4,024	451	4,475	0	0	0	4,475	53
1983	4,031	451	4,482	0	0	0	4,482	55
1984	4,472	501	4,973	0	0	0	4,973	53
1985	4,301	482	4,783	0	0	0	4,783	55
1986	4,350	487	4,837	0	0	0	4,837	56
1987	4,524	507	5,031	0	0	0	5,031	56
1988	4,621	518	5,138	0	0	0	5,138	56
1989	4,427	496	4,923	0	0	0	4,923	59
1990	4,974	536	5,510	184	0	184	5,326	54
1991	4,831	518	5,349	206	0	206	5,143	54
1992	4,992	537	5,529	197	0	197	5,332	54
1993	4,423	473	4,896	202	0	202	4,694	59
1994	4,776	506	5,282	260	0	260	5,022	52
1995	4,725	498	5,223	283	0	283	4,940	55
1996	4,855	515	5,369	260	0	260	5,110	54
1997	5,270	563	5,833	242	0	242	5,591	50
1998	5,270	564	5,834	231	0	231	5,603	49
1999	5,079	543	5,622	234	0	234	5,388	51
2000	4,999	536	5,535	210	0	210	5,325	54
2001	4,512	485	4,997	186	0	186	4,811	58
2002	4,943	526	5,470	243	0	243	5,227	55
2003	5,131	549	5,680	230	0	230	5,450	54
2004	5,139	553	5,692	204	0	204	5,488	56
2005	5,356	577	5,933	207	0	207	5,725	53
2006	5,751	621	6,372	209	0	209	6,163	51
2007	5,322	573	5,894	209	1	210	5,685	56
2008	5,352	576	5,928	209	1	210	5,717	56
2009	5,385	580	5,965	209	2	211	5,754	56
2010	5,414	583	5,997	209	3	212	5,786	56
2011	5,440	586	6,026	209	3	212	5,813	56
2012	5,464	589	6,053	209	4	213	5,840	56
2013	5,486	591	6,077	209	5	214	5,863	56
2014	5,507	593	6,101	209	5	214	5,886	56
2015	5,526	596	6,122	209	6	215	5,907	56
2016	5,546	598	6,144	209	7	216	5,928	56
2017	5,563	600	6,162	209	7	216	5,946	56
2018	5,581	602	6,183	209	8	217	5,966	56

Annual Growth Rates (%)

1980-1990	3.1	2.7	3.1				2.7	-0.7
1990-2000	0.1	0.0	0.0	1.3		1.3	0.0	0.0
2000-2006	2.4	2.5	2.4	-0.1		-0.1	2.5	-0.9
2006-2011	-1.1	-1.2	-1.1	0.0		0.3	-1.2	1.9
2011-2018	0.4	0.4	0.4	0.0	13.3	0.3	0.4	0.0
2006-2018	-0.3	-0.3	-0.3	0.0		0.3	-0.3	0.8

Form 2.2 - LADWP Planning Area
California Energy Demand 2008-2018 Staff Revised Forecast
Planning Area Economic and Demographic Assumptions

Year	Population	Households	Persons per Household	Real Personal Income (Millions 1977\$)	Industrial Value Added (Millions 2005\$)	Commercial Floorspace (MM Sqft.)
1980	2,934,374	1,132,115	2.59	1,132,115	12,902	512
1981	2,953,634	1,135,098	2.60	27,994	13,204	525
1982	2,986,749	1,134,109	2.63	27,968	12,795	539
1983	3,046,734	1,138,978	2.67	28,759	12,953	550
1984	3,117,622	1,149,794	2.71	30,934	13,620	559
1985	3,203,665	1,170,650	2.74	32,596	13,994	570
1986	3,294,981	1,191,439	2.77	33,874	14,184	582
1987	3,361,301	1,205,554	2.79	35,365	14,790	599
1988	3,391,782	1,216,518	2.79	36,146	15,557	614
1989	3,424,671	1,224,802	2.80	36,619	16,123	632
1990	3,426,297	1,225,849	2.80	37,601	16,469	648
1991	3,463,917	1,236,409	2.80	36,505	15,937	664
1992	3,511,438	1,245,796	2.82	36,845	15,878	678
1993	3,521,945	1,253,433	2.81	35,650	15,868	686
1994	3,515,761	1,259,852	2.79	35,728	15,791	690
1995	3,484,021	1,258,593	2.77	36,199	16,659	692
1996	3,483,860	1,261,498	2.76	36,856	16,411	695
1997	3,513,381	1,266,532	2.77	37,743	17,471	698
1998	3,542,204	1,270,477	2.79	40,631	17,603	701
1999	3,592,108	1,278,935	2.81	41,577	17,030	706
2000	3,656,135	1,287,441	2.84	43,122	17,401	714
2001	3,719,258	1,288,888	2.89	44,945	15,249	722
2002	3,777,960	1,293,929	2.92	45,511	14,711	731
2003	3,824,272	1,298,678	2.94	46,173	14,289	740
2004	3,859,864	1,305,094	2.96	47,994	15,022	746
2005	3,889,003	1,312,715	2.96	49,364	15,308	752
2006	3,908,605	1,317,239	2.97	51,505	15,553	760
2007	3,915,165	1,317,356	2.97	53,228	15,731	768
2008	3,921,903	1,317,528	2.98	54,810	16,000	776
2009	3,928,824	1,317,761	2.98	56,370	16,215	784
2010	3,935,931	1,318,051	2.99	57,771	16,364	791
2011	3,940,428	1,317,465	2.99	59,175	16,562	798
2012	3,945,095	1,316,933	3.00	60,471	16,660	806
2013	3,949,960	1,316,464	3.00	61,681	16,794	813
2014	3,954,990	1,316,052	3.01	62,864	16,837	820
2015	3,960,217	1,315,702	3.01	64,036	16,930	827
2016	3,966,005	1,315,535	3.01	65,219	16,996	834
2017	3,971,961	1,315,424	3.02	66,484	17,050	841
2018	3,978,086	1,315,365	3.02	67,795	17,056	848

Annual Growth Rates (%)

1980-1990	1.6	0.8	0.8	-28.9	2.5	2.4
1990-2000	0.7	0.5	0.2	1.4	0.6	1.0
2000-2006	1.1	0.4	0.7	3.0	-1.9	1.0
2006-2011	0.2	0.0	0.2	2.8	1.3	1.0
2011-2018	0.1	0.0	0.2	2.0	0.4	0.9
2006-2018	0.1	0.0	0.2	2.3	0.8	0.9

CHAPTER 7: NATURAL GAS DEMAND FORECAST

This chapter presents the staff revised forecasts of end-user natural gas demand for the PG&E, Southern California Gas (SCG), and SDG&E natural gas planning areas. Staff prepares these forecasts in parallel with its electricity demand forecasts. The models staff uses are organized along electricity planning area boundaries. The gas demand forecasts presented here are the aggregate of gas demand in the corresponding electricity planning areas. These forecasts do not include natural gas used by utilities or others for electric generation or cogeneration.

The revised forecast incorporates three changes compared to the draft forecast: 2006 actual consumption, the July 2007 Department of Finance (DOF) population projections, and a revised forecast of natural gas prices. The natural gas prices used in the revised forecast are those developed for Energy Commission staff's August 2007 natural gas assessment.¹⁸ Prices used in the draft forecast were from the June 2005 assessment prepared for the *2005 Integrated Energy Policy Report*.¹⁹ The base year of historic consumption in the draft forecast was 2005. See Chapter 1 for a discussion of economic and demographic assumptions.

Forecast Results

Table 33 compares the statewide revised and draft forecasts with the *CED 2006* forecast for selected years. The revised 2008 forecast has a lower starting point because recorded 2006 consumption was lower than previously forecast. The revised growth rate is slightly lower because of a higher natural gas price forecast.

¹⁸¹⁸ *Revised Natural Gas Market Assessment, in Support of the 2007 Integrated Energy Policy Report*, Draft staff report, publication no. CEC-200-2007-009-REV.

¹⁹ *Preliminary Reference Case, in Support of the 2005 Natural Gas Market Assessment*, publication no. CEC-600-2005-025.

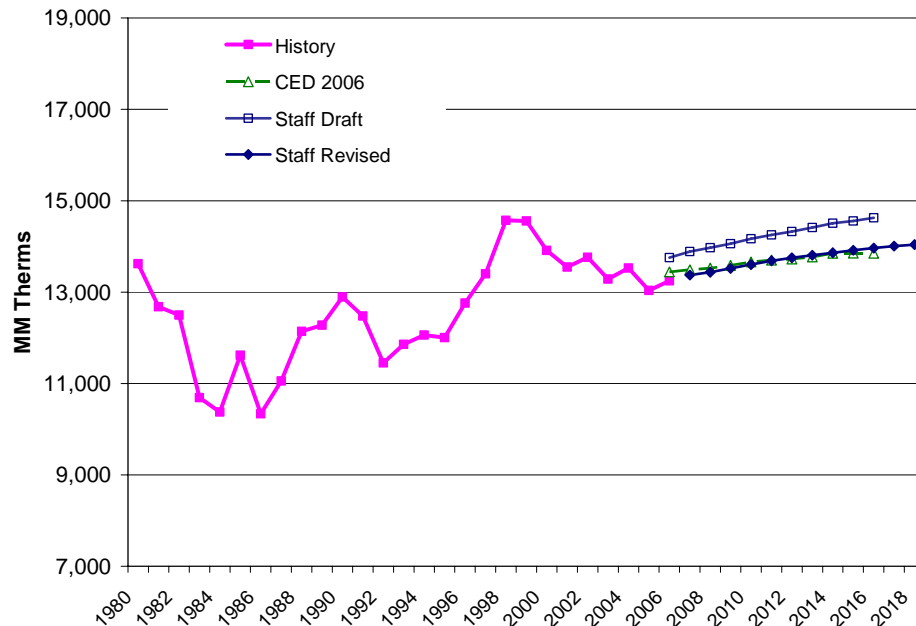
Table 33: Statewide Natural Gas Forecast Comparison

Consumption (MM Therms)					
	CED 2006	Staff Draft (July 2007)	Staff Revised (Oct. 2007)	Percent Difference Staff Revised/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	12,893	12,893	12,893	0.0%	0.0%
2000	13,915	13,915	13,913	0.0%	0.0%
2005	13,550	13,041	13,039	-3.8%	0.0%
2008	13,528	13,970	13,434	-0.7%	-3.8%
2016	13,850	14,625	13,962	0.8%	-4.5%
Annual Average Growth Rates					
1990-2000	0.77%	0.77%	0.76%		
2000-2005	-0.53%	-1.29%	-1.29%		
2005-2008	-0.05%	2.32%	1.00%		
2008-2016	0.30%	0.57%	0.48%		
Historic values are shaded					

Source: California Energy Commission, 2007.

Figure 143 shows a comparison of the 2008 revised and draft statewide forecasts with the *CED 2006* forecast. Inclusion of the lower 2006 historic consumption reduces the 2008 starting point of the revised forecast back to the level of the *CED 2006* forecast, but with a slightly higher growth rate than the earlier forecast.

Figure 143: Natural Gas Demand Forecast

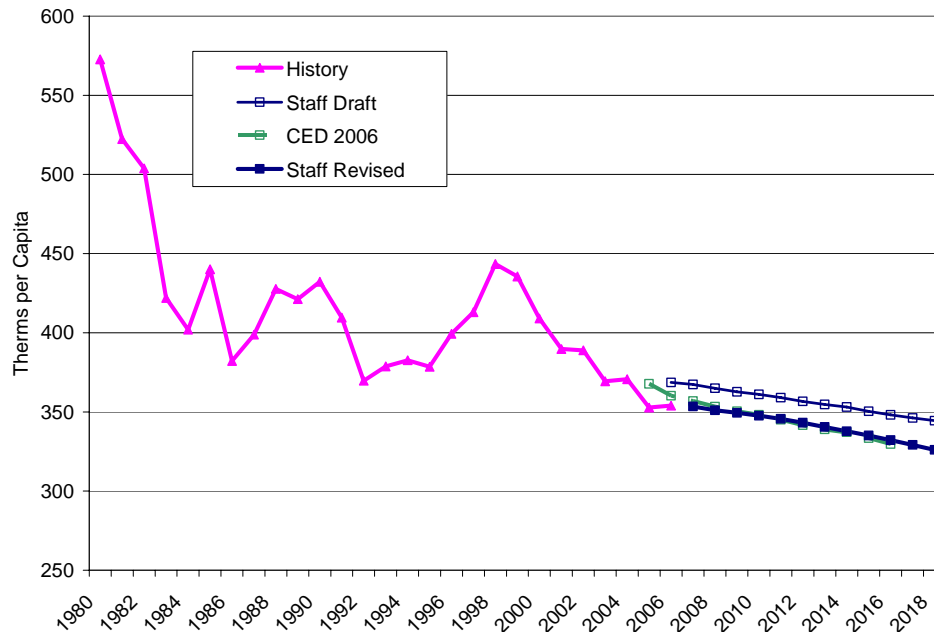


Source: California Energy Commission, 2007.

Figure 144 compares the previous and revised forecasts of per capita natural gas consumption. Historic per capita demand varies in response to annual temperatures and business conditions, but has generally been declining over time. Projected per

capita consumption in the revised forecast has now returned to the levels projected in *CED 2006*. All forecasts continue to project a steady decline in per capita consumption over the forecast period.

Figure 144: Statewide per Capita Natural Gas Consumption



Source: California Energy Commission, 2007.

Planning Area Results

Pacific Gas and Electric Planning Area

The PG&E natural gas planning area is defined as the combined PG&E and SMUD electric planning areas. It includes all PG&E retail gas customers and customers of private marketers using the PG&E natural gas distribution system.

Table 34 compares the PG&E planning area forecasts. Consumption in 2006 was somewhat lower than was projected in the draft forecast. Combined with the effects of higher gas prices, by the end of the forecast period, demand is more than 3.4 percent lower in the revised forecast than in the draft forecast.

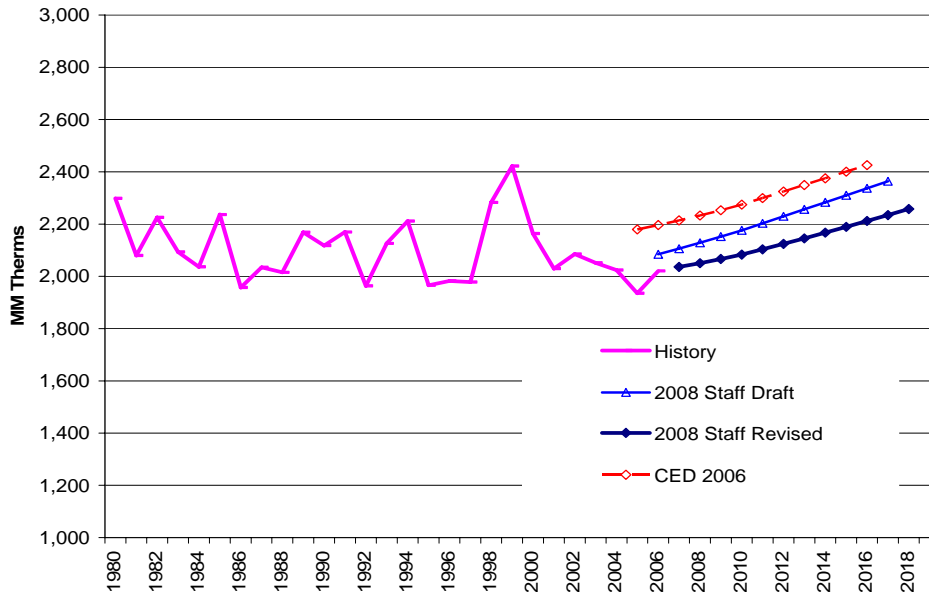
Table 34: PG&E Natural Gas Forecast Comparison

Consumption (MM Therms)					
	CED 2006	Staff Draft (July 2007)	Staff Revised (Oct. 2007)	Percent Difference Staff Revised/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	5,275	5,275	5,275	0.0%	0.0%
2000	5,291	5,291	5,291	0.0%	0.0%
2005	4,852	4,724	4,724	-2.6%	0.0%
2008	4,940	5,025	4,985	0.9%	-0.8%
2016	5,181	5,324	5,144	-0.7%	-3.4%
Annual Average Growth Rates					
1990-2000	0.03%	0.03%	0.03%		
2000-2005	-1.72%	-2.24%	-2.24%		
2005-2008	0.60%	2.08%	1.81%		
2008-2016	0.60%	0.73%	0.39%		
Historic values are shaded					

Source: California Energy Commission, 2007.

Figure 145 compares the revised 2008 forecast and previous PG&E planning area forecast for the residential sector. The revised forecast is lower throughout the entire forecast period, as actual consumption recorded in 2006 was lower than predicted in *CED 2006*, but all forecasts have similar growth rates.

Figure 145: PG&E Planning Area Residential Consumption

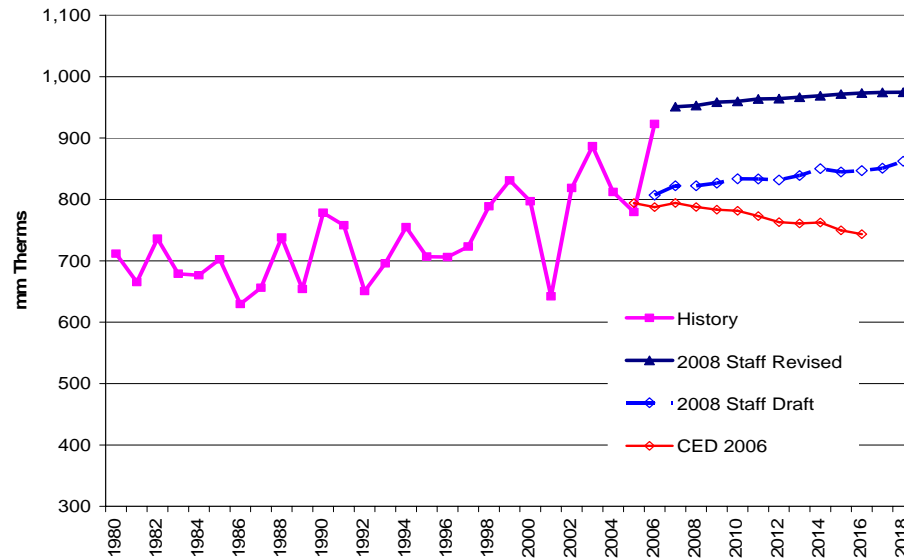


Source: California Energy Commission, 2007.

Figure 146 compares the revised 2008 commercial sector gas demand forecasts with the draft and *CED 2006* commercial sector gas demand forecasts. Commercial gas use is now expected to rise at a rate slower than that experienced in recent years of the historic period, continuing the changed growth pattern from the *CED*

2006 forecast that first appeared in the draft forecast. New commercial floor space projections described in Chapter 1 are partially responsible for this change.

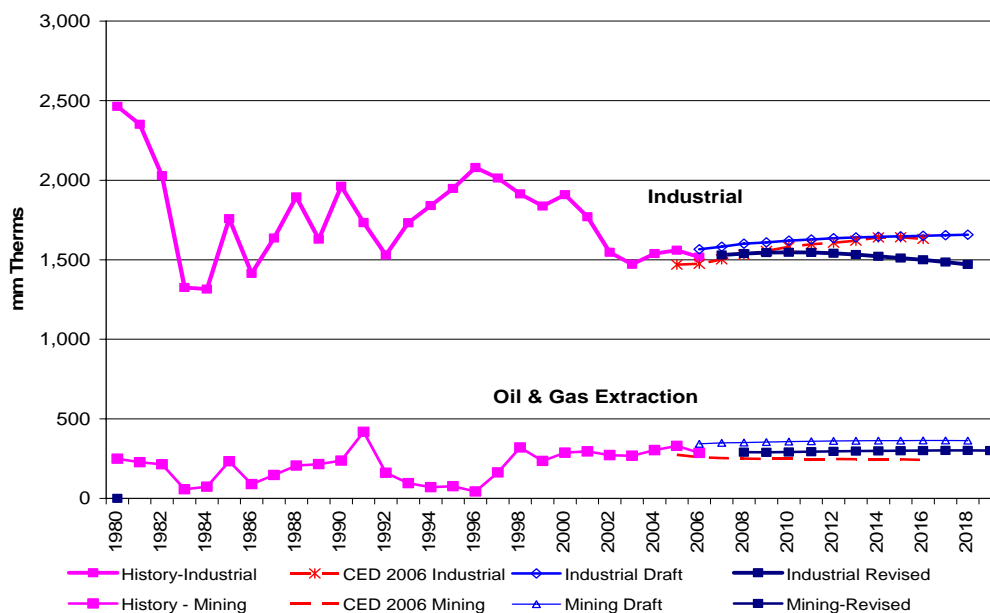
Figure 146: PG&E Planning Area Commercial Gas Demand



Source: California Energy Commission, 2007.

Figure 147 shows the revised 2008 industrial forecast is relatively unchanged in the early years, but lower in later years, reflecting higher fuel prices. The revised 2008 oil and gas extraction forecast is relatively constant over the forecast period, similar to the draft forecast.

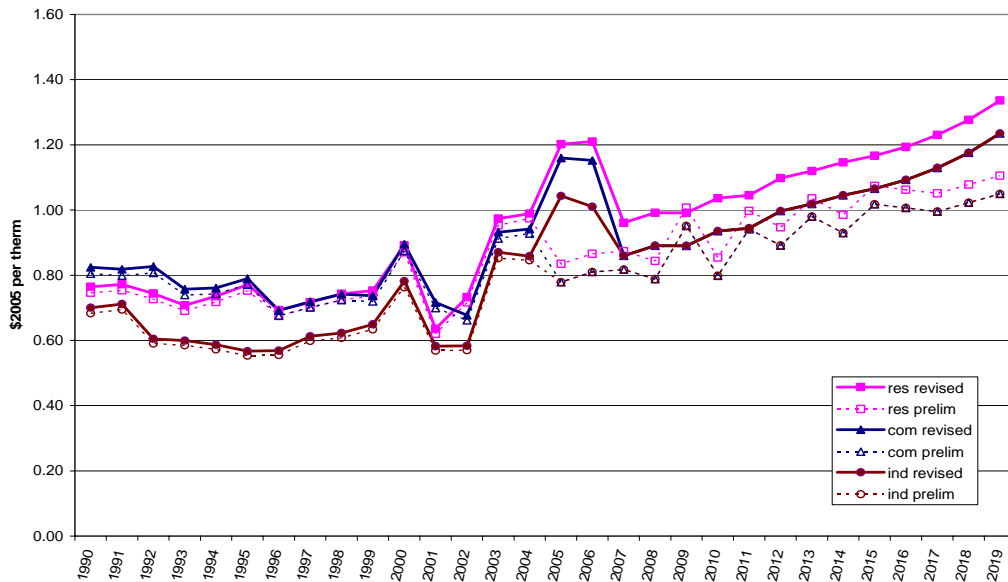
Figure 147: PG&E Planning Area Industrial Natural Gas Demand



Source: California Energy Commission, 2007.

Figure 148 compares prices used in the revised and draft forecasts by sector. Both the residential and nonresidential prices used in the revised forecast are higher in the long run than the prices used in the draft 2008 forecast.

Figure 148: PG&E Planning Area Prices



Source: California Energy Commission, 2007.

Southern California Gas Company Planning Area

The Southern California Gas planning area is composed of the SCE, Burbank and Glendale, Pasadena, and LADWP electric planning areas. It includes customers of those utilities, plus customers of private marketers using the SCG natural gas distribution system.

Table 35 provides a comparison of the SCG planning area forecasts. The revised 2008 forecast grows at a higher rate than the *CED 2006* forecast because of higher commercial floor space projections. The new DOF population projections increase residential demand directly and commercial demand indirectly as businesses serve population growth. Although total recorded gas use in the planning area was lower than projected, by the end of the forecast period the revised 2008 forecast is 1.4 percent higher than the *CED 2006* forecast.

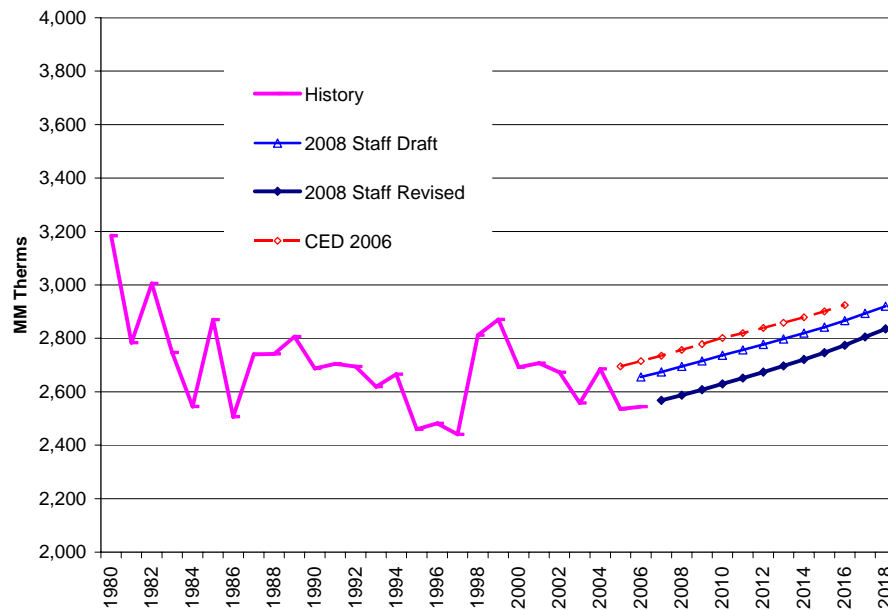
Table 35: SCG Natural Gas Forecast Comparison

Consumption (MM Therms)					
	CED 2006	Staff Draft (July 2007)	Staff Revised (Oct. 2007)	Percent Difference Staff Draft/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	6,806	6,806	6,806	0.0%	0.0%
2000	7,939	7,939	7,938	0.0%	0.0%
2005	8,020	7,662	7,662	-4.5%	0.0%
2008	7,892	8,253	7,734	-2.0%	-6.3%
2016	7,924	8,549	8,038	1.4%	-6.0%
Annual Average Growth Rates					
1990-2000	1.55%	1.55%	1.55%		
2000-2005	0.20%	-0.71%	-0.71%		
2005-2008	-0.53%	2.51%	0.31%		
2008-2016	0.05%	0.44%	0.48%		
Historic values are shaded					

Source: California Energy Commission, 2007.

Figure 149 compares the residential gas demand forecasts. The revised forecast is lower throughout the forecast period than the *CED 2006* forecast due to a lower starting point. The initial starting point of the revised forecast is also lower than the draft forecast, but higher growth, due to increased population projections for the SCG area, decreases the forecast differences slightly by the end of the forecast period.

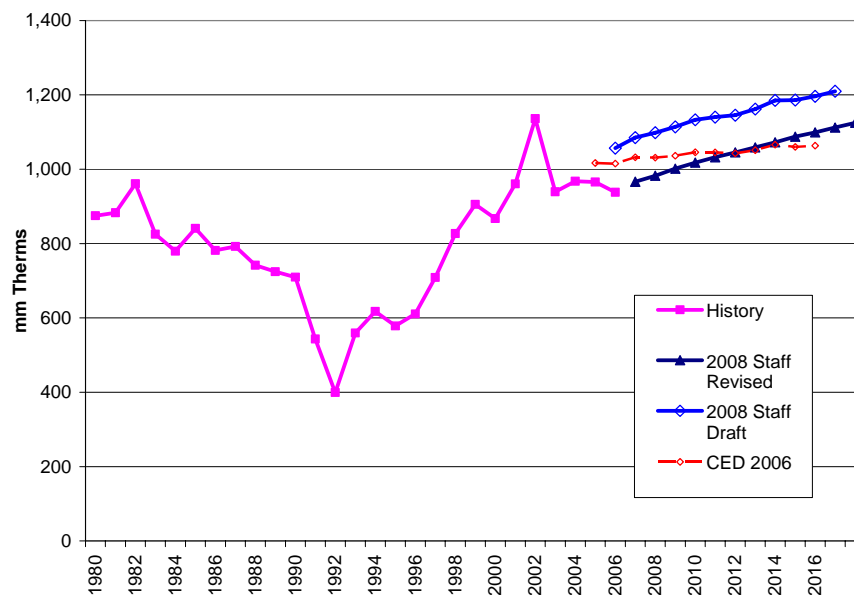
Figure 149: SCG Planning Area Residential Natural Gas Consumption



Source: California Energy Commission, 2007.

Figure 150 provides a comparison of the commercial sector forecasts, the revised 2008 forecast is now expected to increase at a higher rate than in the draft 2008 or *CED 2006* forecasts because of faster population growth and floor space projections. The revised forecast also starts from a lower point than both the draft and *CED 2006* forecast because historic consumption was lower than expected.

Figure 150: SCG Planning Area Commercial Natural Gas Consumption



Source: California Energy Commission, 2007.

Figure 151 shows that the revised 2008 industrial forecast is slightly lower than the previous forecasts and is nearly flat throughout the forecast period. The mining sector (including oil and gas extraction) is now predicted to stay relatively flat instead of declining over the forecast period.

**Figure 151: SCG Planning Area
Industrial and Mining Natural Gas Consumption**

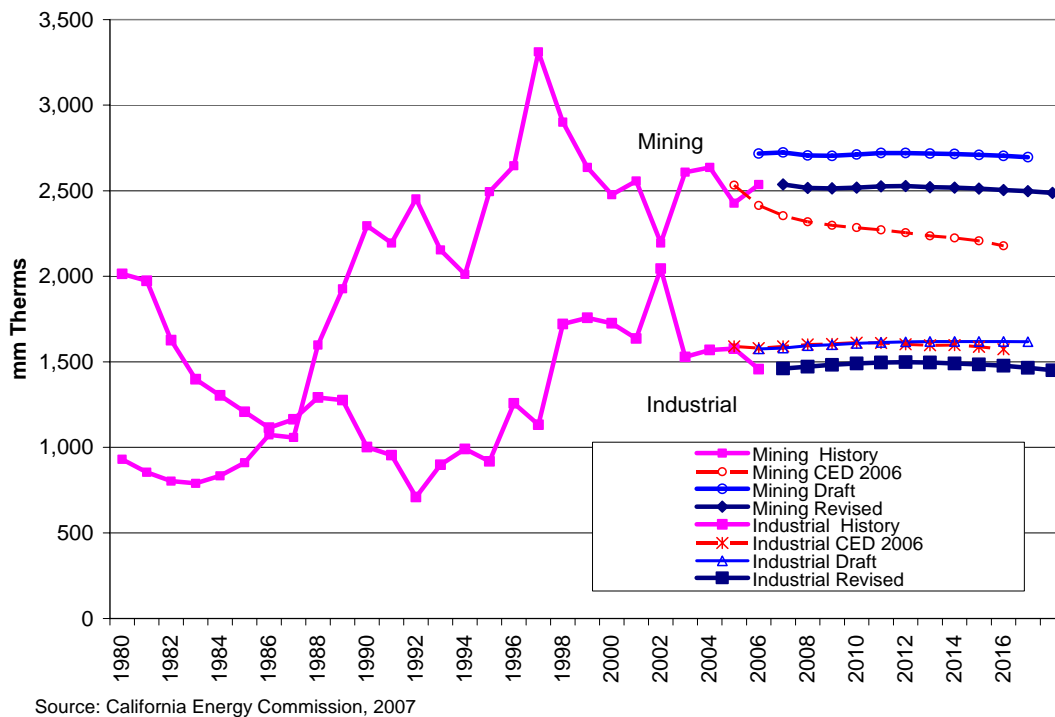
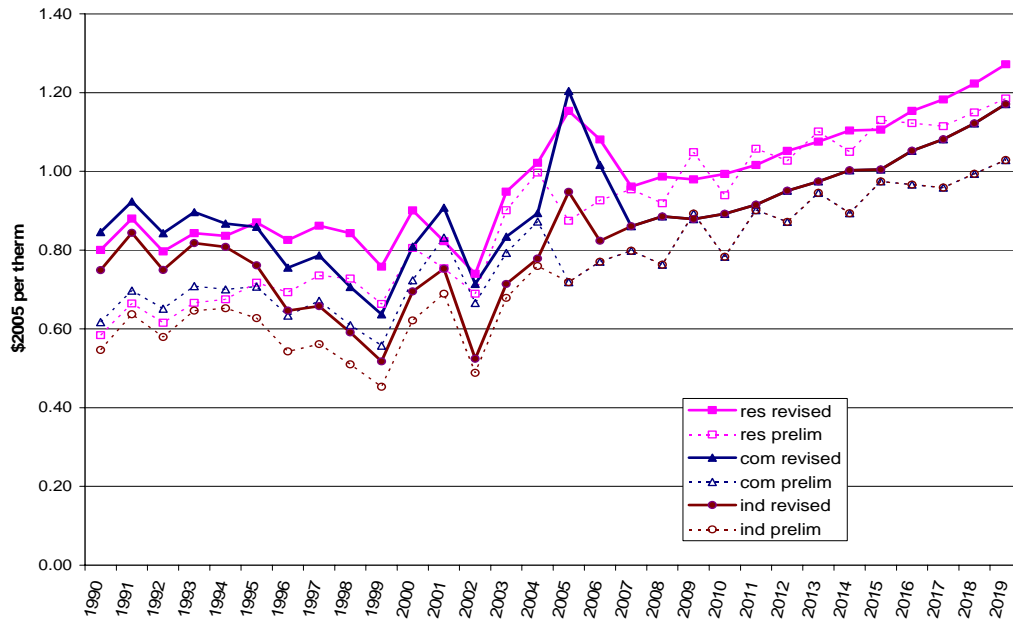


Figure 152 compares SCG sector natural gas prices used in the revised and draft forecasts by sector. Both the residential and nonresidential prices used in the revised forecast are higher in the long run than the prices used in the draft forecast.

Figure 152: SCG Planning Area Prices



Source: California Energy Commission, 2007.

San Diego Gas and Electric Planning Area

The SDG&E planning area contains SDG&E customers and customers of private marketers using the SDG&E natural gas distribution system.

Table 36 shows the SDG&E planning area forecasts to be very similar. The revised 2008 forecast is lower in the short term because of a lower starting point than was projected in the *CED 2006* forecast. The revised 2008 forecast is slightly higher than the draft forecast, primarily because of higher recorded 2006 consumption. This difference diminishes over time because of lower economic and demographic projections and higher natural gas prices.

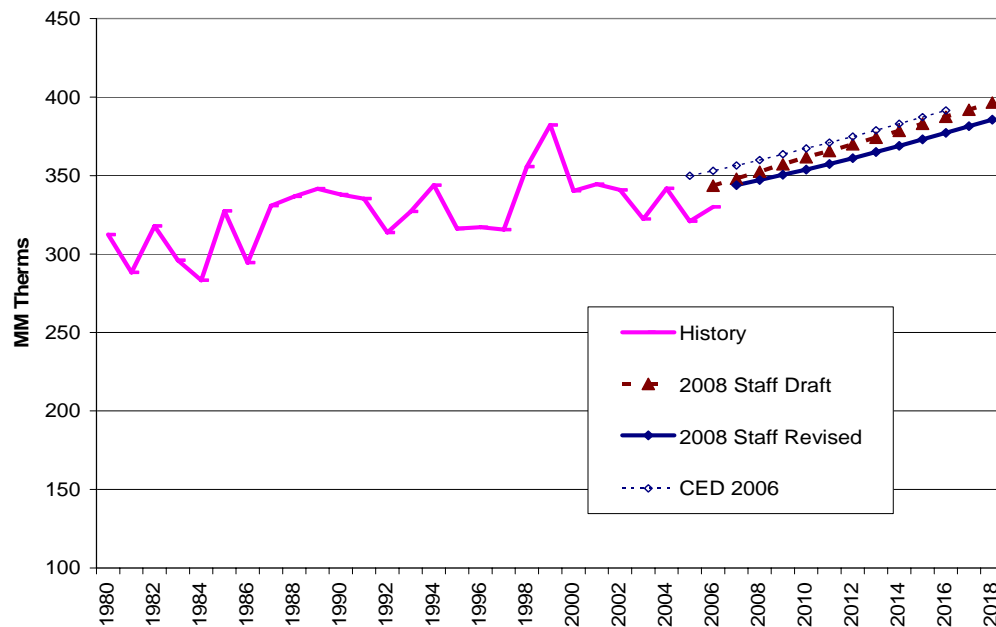
Table 36: SDG&E Natural Gas Forecast Comparison

Consumption (MM Therms)					
	CED 2006	Staff Draft (July 2007)	Staff Revised (Oct. 2007)	Percent Difference Staff Revised/CED 2006	Percent Difference Staff Revised/Staff Draft
1990	517	517	517	0.0%	0.0%
2000	566	566	565	0.0%	0.0%
2005	549	530	530	-3.5%	-0.1%
2008	566	560	573	1.3%	2.3%
2016	611	620	631	3.2%	1.8%
Annual Average Growth Rates					
1990-2000	0.90%	0.90%	0.90%		
2000-2005	-0.60%	-1.30%	-1.30%		
2005-2008	1.01%	1.88%	2.66%		
2008-2016	0.97%	1.27%	1.21%		
Historic values are shaded					

Source: California Energy Commission, 2007.

Figure 153 provides a comparison of the SDG&E planning area residential gas consumption forecasts. The revised 2008 residential forecast is slightly lower than the draft 2008 forecast because of inclusion of 2006 historic data in the calibration procedure. The revised forecast grows at a lower rate, due to decreased population projections compared with those used in the draft forecast.

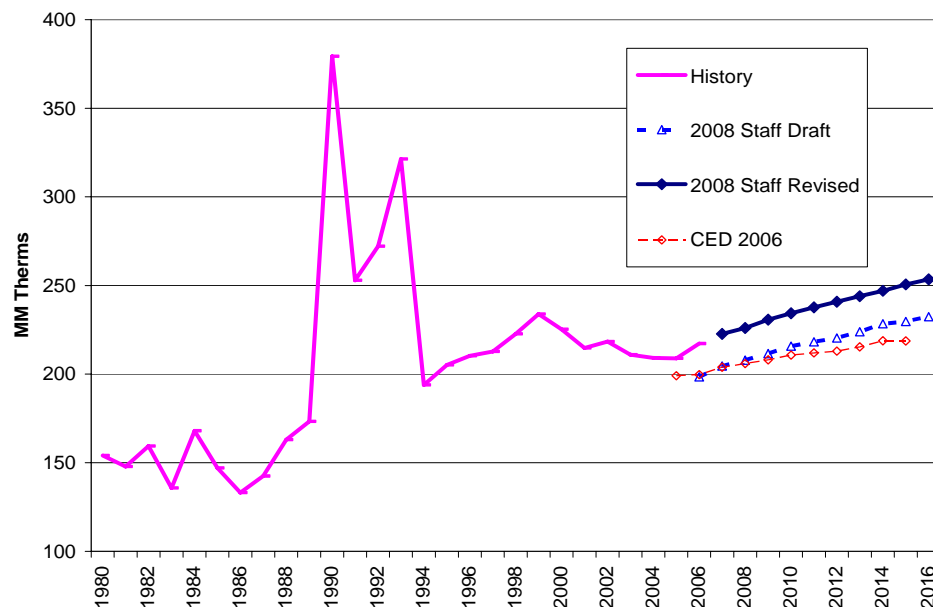
Figure 153: SDG&E Planning Area Residential Natural Gas Consumption



Source: California Energy Commission, 2007

In the SDG&E nonresidential sector (**Figure 154**) the revised 2008 forecast grows at a rate similar to the draft 2008 forecast. However, the starting point is higher because actual consumption in the commercial sector was 6 percent higher than projected in 2006. Industrial sector historic consumption was also higher than projected, but the industrial sector in SDG&E area is very small, so the two sectors are combined for reporting purposes.

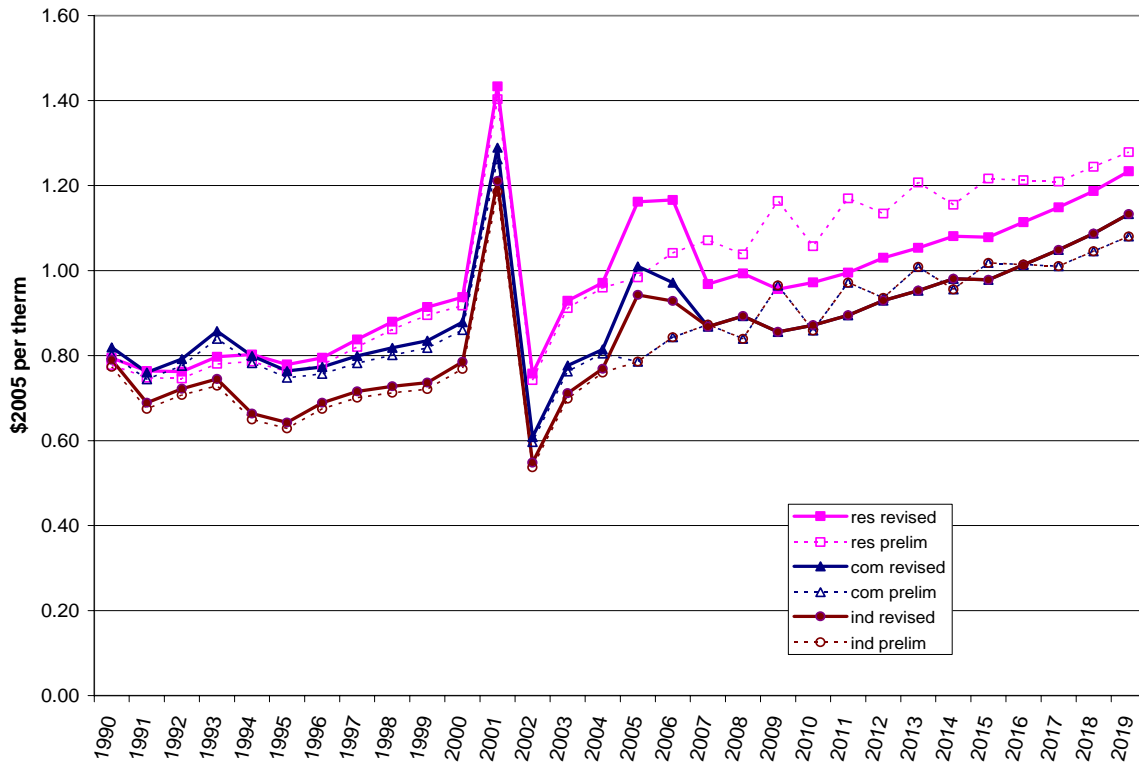
Figure 154: SDG&E Planning Area Nonresidential Natural Gas Consumption



Source: California Energy Commission, 2007

Figure 155 compares SDG&E sector natural gas prices used in the revised and draft forecasts by sector. Residential prices are lower throughout the forecast period in the revised forecast. Commercial and industrial prices used in the revised forecast are similar to those used in the draft forecast until the latter part of the forecast period. In the latter part of the forecast period, the revised prices become higher than the draft prices.

Figure 155: SDG&E Planning Area Prices



Source: California Energy Commission, 2007.

**Table 37 - PG&E Planning Area
Natural Gas Consumption by Sector (10⁶ Therms)**

	Residential	Commercial	Industrial	Mining	Agricultural	Other	Total Consumption
1980	2,298	712	2,464	250	73	113	5,909
1981	2,079	665	2,351	228	62	116	5,503
1982	2,226	736	2,029	215	58	122	5,385
1983	2,093	679	1,326	58	49	106	4,311
1984	2,036	677	1,316	74	48	106	4,256
1985	2,236	702	1,758	234	52	114	5,096
1986	1,958	630	1,413	89	46	101	4,237
1987	2,034	656	1,637	148	50	101	4,626
1988	2,015	738	1,895	207	56	159	5,070
1989	2,168	654	1,630	216	59	108	4,834
1990	2,118	778	1,962	238	65	114	5,275
1991	2,169	758	1,733	418	60	122	5,260
1992	1,963	651	1,530	162	50	90	4,445
1993	2,126	696	1,732	96	40	95	4,786
1994	2,211	755	1,840	71	52	98	5,027
1995	1,966	707	1,948	77	47	76	4,821
1996	1,982	706	2,080	44	55	81	4,948
1997	1,978	723	2,014	163	64	67	5,010
1998	2,283	789	1,914	319	70	67	5,442
1999	2,422	831	1,837	236	71	64	5,461
2000	2,164	797	1,909	288	79	55	5,291
2001	2,029	642	1,770	296	50	67	4,853
2002	2,086	819	1,547	272	59	35	4,818
2003	2,051	887	1,471	268	85	49	4,810
2004	2,024	812	1,538	304	65	68	4,811
2005	1,935	779	1,560	329	41	79	4,724
2006	2,021	923	1,517	286	48	104	4,899
2007	2,036	951	1,530	291	48	105	4,961
2008	2,050	953	1,539	290	48	106	4,985
2009	2,066	959	1,545	291	48	106	5,015
2010	2,083	960	1,547	293	48	107	5,038
2011	2,103	964	1,546	296	48	107	5,064
2012	2,124	964	1,541	297	48	108	5,082
2013	2,145	967	1,533	298	48	109	5,100
2014	2,167	969	1,522	300	48	109	5,114
2015	2,189	972	1,511	301	48	110	5,131
2016	2,212	973	1,500	301	48	111	5,144
2017	2,235	974	1,486	301	48	111	5,155
2018	2,258	975	1,470	301	48	112	5,163

Annual Growth Rates (%)

1980-1990	-0.8	0.9	-2.3	-0.5	-1.2	0.1	-1.1
1990-2000	0.2	0.2	-0.3	1.9	1.9	-7.0	0.0
2000-2005	-2.2	-0.4	-4.0	2.7	-12.3	7.3	-2.2
2005-2008	1.9	6.9	-0.5	-4.2	5.4	10.4	1.8
2008-2018	1.0	0.2	-0.5	0.4	0.0	0.6	0.4
2005-2018	1.2	1.7	-0.5	-0.7	1.2	2.7	0.7

**Table 38 - PG&E Planning Area
Natural Gas Consumption by Sector (10⁶ Therms)**

	Residential	Commercial	Industrial	Mining	Agricultural	Other	Total Consumption
1980	3,184	875	2,014	930	71	94	7,168
1981	2,784	883	1,973	854	80	102	6,676
1982	3,006	961	1,626	803	70	111	6,577
1983	2,747	825	1,398	790	50	88	5,898
1984	2,545	779	1,303	834	54	84	5,599
1985	2,870	841	1,208	910	53	83	5,965
1986	2,507	782	1,115	1,073	44	80	5,600
1987	2,740	792	1,164	1,058	44	78	5,875
1988	2,741	742	1,292	1,598	44	69	6,487
1989	2,806	725	1,276	1,927	41	64	6,838
1990	2,687	710	1,002	2,295	45	67	6,806
1991	2,705	543	954	2,194	34	109	6,539
1992	2,694	399	710	2,452	26	47	6,329
1993	2,620	559	899	2,153	33	58	6,322
1994	2,666	617	990	2,011	44	62	6,390
1995	2,459	578	919	2,494	40	67	6,557
1996	2,482	611	1,257	2,646	48	130	7,174
1997	2,441	709	1,132	3,311	63	87	7,743
1998	2,812	827	1,721	2,900	69	87	8,416
1999	2,870	905	1,757	2,635	87	92	8,347
2000	2,692	867	1,725	2,476	90	87	7,938
2001	2,707	960	1,636	2,556	86	74	8,020
2002	2,673	1,136	2,044	2,195	114	99	8,261
2003	2,558	939	1,529	2,608	102	77	7,814
2004	2,685	968	1,569	2,636	101	66	8,025
2005	2,536	965	1,578	2,427	85	71	7,662
2006	2,544	938	1,458	2,536	87	88	7,651
2007	2,568	966	1,460	2,537	87	89	7,707
2008	2,587	982	1,471	2,516	87	90	7,734
2009	2,608	1,002	1,482	2,513	87	91	7,782
2010	2,630	1,018	1,490	2,519	87	92	7,835
2011	2,651	1,032	1,496	2,526	87	92	7,884
2012	2,673	1,045	1,498	2,526	87	93	7,923
2013	2,696	1,059	1,495	2,521	87	94	7,952
2014	2,721	1,072	1,490	2,518	87	95	7,983
2015	2,747	1,088	1,485	2,513	87	96	8,014
2016	2,774	1,099	1,477	2,504	87	97	8,038
2017	2,805	1,112	1,465	2,497	87	97	8,063
2018	2,835	1,125	1,450	2,487	87	98	8,083

Annual Growth Rates (%) 0.126010066

1980-1990	-1.7	-2.1	-6.7	9.5	-4.4	-3.3	-0.5
1990-2000	0.0	2.0	5.6	0.8	7.2	2.7	1.6
2000-2005	-1.2	2.2	-1.8	-0.4	-1.2	-4.1	-0.7
2005-2008	0.7	0.6	-2.3	1.2	0.7	8.2	0.3
2008-2018	0.9	1.4	-0.1	-0.1	0.0	0.9	0.4
2005-2018	0.9	1.2	-0.6	0.2	0.2	2.5	0.4

**Table 39 - PG&E Planning Area
Natural Gas Consumption by Sector (10⁶ Therms)**

Year	Residential	Commercial	Industrial	Mining	Agricultural	Other	Total Consumption
1980	312	90	40	1	9	14	466
1981	288	86	39	1	8	14	436
1982	318	89	46	2	4	18	477
1983	296	88	27	2	5	13	432
1984	283	90	51	3	5	19	451
1985	327	89	36	3	4	15	474
1986	295	78	35	4	3	13	428
1987	331	78	43	5	4	14	473
1988	337	92	44	6	4	17	500
1989	342	92	52	7	4	18	515
1990	338	160	172	8	6	33	717
1991	335	136	82	6	5	23	588
1992	314	143	94	6	4	26	586
1993	327	174	104	5	8	30	648
1994	344	108	60	4	6	16	538
1995	316	118	62	4	6	16	521
1996	317	114	63	6	8	20	527
1997	316	173	29	1	3	7	528
1998	356	127	68	2	7	18	578
1999	382	136	68	2	8	20	616
2000	340	87	125	2	3	9	565
2001	345	149	38	2	6	19	559
2002	341	153	40	3	7	16	559
2003	322	152	34	6	6	14	533
2004	342	155	29	5	6	13	551
2005	321	159	27	5	5	13	530
2006	330	154	29	4	5	25	547
2007	344	158	29	5	5	25	567
2008	347	161	30	5	5	25	573
2009	351	165	30	5	5	26	581
2010	354	168	31	5	5	26	588
2011	357	171	31	5	5	26	595
2012	361	174	32	5	5	26	602
2013	365	176	32	5	5	26	609
2014	369	179	32	5	5	26	616
2015	373	182	33	5	5	26	624
2016	377	184	33	5	5	27	631
2017	381	187	33	5	5	27	638
2018	386	189	34	5	5	27	645

Annual Growth Rates (%)

1980-1990	0.8	5.8	15.7	22.9	-3.4	9.3	4.4
1990-2000	0.1	-5.8	-3.2	-13.6	-7.8	-12.7	-2.3
2000-2005	-1.2	12.7	-26.5	22.9	13.4	8.4	-1.3
2005-2008	2.7	0.5	4.0	-3.5	-3.3	25.5	2.7
2008-2018	1.1	1.6	1.1	0.0	0.0	0.6	1.2
2005-2018	1.4	1.3	1.8	-0.8	-0.8	5.9	1.5